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Assessing the level of appropriateness of language support in CLIL textbooks for Primary Education in Aragon

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Abstract

This investigation focuses on assessing the level of language support given by CLIL textbooks in Aragon. In order to do this, an assessment instrument was designed. Its items are based on key methodological principles on Communication in CLIL, i.e. the Language Triptych (Language of, for and through Learning), Basic Interpersonal Communicative Skills (BICS), Cognitive Academic Language Proficiency (CALP) and specific principles of CLIL textbook design. A grading scale determines the level of presence or absence of these characteristics and a final summary of the results dictates whether or not the analysed textbook provides the CLIL learning environment with appropriate language support. The resulting assessment instrument has been tested on two sample units of commercially available textbooks, concluding that none showed enough evidence to cover at least 40% of the criteria. The assessment instrument has proved to be effective in identifying which specific aspects of communication in CLIL are needed to be modified, in order to provide the learning environment with appropriate language support. This can be particularly helpful for novice and non-CLIL teachers, not only when choosing a textbook but also when compensating for flaws in their design. This is expected to improve the quality of teaching in Aragón.

Key words: CLIL, language support, communication, textbook assessment.

Resumen

Esta investigación se centra en la evaluación del nivel de soporte lingüístico en libros de texto AICLE en Aragón. Para ello, se ha diseñado un instrumento de evaluación cuyos indicadores están fundamentados en principios metodológicos clave de la comunicación en AICLE. Estos son el Tríptico del Lenguaje (lenguaje de, para y a través del aprendizaje), las Destrezas Comunicativas Interpersonales Básicas (DCIB) y de Dominio Cognitivo del Lenguaje Académico (DCLA), y principios específicos en diseño instruccional de material AICLE. Una escala de evaluación determina el nivel de presencia o de ausencia de estas características, y un resumen de los resultados indica si el libro de texto analizado garantiza un soporte lingüístico apropiado o no. El instrumento ha sido probado en dos unidades de libros disponibles a nivel comercial, concluyendo que la presencia de estos principios metodológicos clave en comunicación AICLE fue menor al 40% y, por ende, el soporte lingüístico que proveen no es apropiado. El instrumento ha sido efectivo en identificar aquellos aspectos de la comunicación en AICLE que necesitan de modificación de manera que docentes con poca experiencia y aquellos sin formación en AICLE puedan compensar las carencias en este aspecto, mejorando la calidad de la enseñanza en Aragón.

Palabras clave: AICLE, soporte lingüístico, comunicación, evaluación de libros de texto.

1. Introduction

Selecting an adequate textbook for the bilingual classroom can be a challenging task. This requires the teacher to evaluate the material to see if it adapts well, not only to the requirements of the curriculum, but also to the adopted methodological approach. In the case of Aragón, this is Content and Language Integrated Learning (CLIL). This procedure is known as textbook assessment and it *"involves measuring the value or potential value of a set of learning materials"* (Tomlinson, 2003, in Cruces, 2015, p.17). In other words, this means determining in advance whether a textbook will enhance the learning process or, on the contrary, hinder it. To do this, teachers can make use of textbook assessment instruments, such as checklists, which can help them more accurately and systematically discriminate the material in a considerably short amount of time.

Considering that in the last decade several authors have identified the lack of evaluation being performed on CLIL textbooks (Codina, 2019; López, 2016; Cruces, 2015; Martín & Rascón, 2015), as well as the inadequacy of their design, especially on the language support they provide (Codina, 2019; Cruces, 2015; García, 2015), it has been made relevant that there is a current need for textbook assessment mechanisms to be designed, so that better practices can be performed. In response to the former, this investigation presents the design and application of a preliminary assessment instrument which is expected to help teachers across the Autonomous Community of Aragón with the identification of characteristics and qualities regarding the appropriateness of the language support given in available CLIL textbooks.

A first chapter, called *introduction*, starts the discussion on textbook assessment and outlines the content of the different chapters in this paper. Chapter 2, called *purpose and objectives,* presents the main and subsidiary aims of the paper. This is followed by a third chapter, titled *theoretical and curricular framework,* in which a brief history of the bilingualism in Aragon is discussed so that the current expectations of the Autonomous Community in this matter are set. A further exploration of CLIL's principles with distinctive focus on Communication is presented. This is intended to establish the foundations on which the design of the assessment instrument will be based. A subsequent section on the role of textbooks in the learning environment in CLIL will help with setting the relevance of their consideration and assessment when course planning in a CLIL environment.

Chapter 4, called *methodology and justification*, presents the methodological bases which support the design of the instrument, as well as a comprehensible definition and reasoning for having chosen it. This is complemented with an explanation on how a trial execution of the assessment instrument will be carried out on two units from different well-known publishers. A successive section provides the reader with a comprehensive rationale for this paper which aims at setting the relevance of the study in the current moment in the history of CLIL in Aragón.

In chapter 5, called *design and analysis of materials,* the resulting assessment instrument is presented, a commentary on its characteristics and the theoretical background that supports it are reviewed. This is followed by an explanation of the procedure followed to assess the two sample units, using the created checklist. The chapter continues with a presentation of the results obtained after the application of the instrument and a final critique on their level of appropriateness in language support. At the end of the chapter, some limitations for the realisation of this investigation are presented. Finally, in chapter 6, conclusions are drawn and recommendations on possible future fields of research are given.

2. Purpose and objectives

2.1 Objectives

The present investigation aims at *assessing the level of appropriateness of language support given in CLIL textbooks for the bilingual primary education context in Aragon*.

In order to do this successfully, several subsidiary aims must be accomplished. First of all, to set the curricular framework of the investigation, a brief historical revision of the progressive presence and relevance of CLIL in the Aragonese context, leading into the present day when the CLIL has been endorsed as the approach to be implemented by bilingual schools across the Autonomous Community.

Secondly, the principles of CLIL will be reviewed, paying special attention to those regarding communication. Additionally, the principles of CLIL textbook design pertaining to communication will be revised. The before mentioned will determine the minimum and desired requirements on language support that a textbook needs to have. This discussion will serve as the foundation of the content of the assessment instrument.

Subsequently, in order to design the instrument, methodological theories and aspects on pedagogical material assessment will be reviewed. These will be brought together to create a tentative assessment instrument which can gauge the level of language support given by CLIL textbooks. Furthermore, to validate the created assessment instrument, as well as to set an example of how to apply it, the instrument will be used to assess the language support given in two different sample units of well-known publishers.

The data collected from the trial test will allow for conclusions to be drawn regarding the design of the instrument and its possible implications in the current and future bilingual primary education context in Aragón.

2.2 Hypothesis

If the characteristics of a commercially available CLIL textbook regarding communication are compared to what the principles of the approach stand for this component, then the language support provided by that book can be measured and its appropriateness for a CLIL learning environment can be determined.

3. Theoretical and Curricular Framework

In this section, a discussion on relevant curricular and theoretical aspects is presented. First, a brief history of bilingualism in Aragon will depict the role of CILL for the last two decades, whilst a further section will focus on the main characteristics of CLIL, paying special attention to what is understood by appropriate language support. Finally, the characteristics of CLIL textbooks regarding communication will be set. All this will lead on to the establishment of criteria which will be later used in the design of the instrument.

3.1 A Brief History of Bilingualism in Aragon

According to Llinares, Morton, & Whittaker (2012), Content and Language Integrated Learning (CLIL) gained popularity in Europe in 1995 when the European Commission's White Paper on Education and Training released the 1+2 policy. In Spain, the Ministry of Education together with the British Council launched a bilingual project whose aim was to support teachers with training so that they could integrate a foreign language and a subject, whilst developing students' cognition, cultural diversity awareness and modern technologies skills (Griñón, 2019; Arellano, et al., 2015). The project known as the MEC-British Council programme proposed its own integrated curricula and its characteristics matched CLIL's well, however an explicit reference to the approach was not made in the document.

Whilst the MEC-British Council project has remained ongoing since it was first published in 1996, the 'Programa Integral de Bilingüismo en Lenguas Extranjeras en Aragón' (PIBLEA) was made official for all public and semi-public primary education centres in the region in 2013 (Orden 14 de febrero 2013). Its main aim was to regulate and promote bilingualism in Aragón through 'Currículos Impartidos en Lengua Extranjera' (CILE), allowing schools to choose the areas taught in the foreign language. In PIBLEA's pedagogical guidelines, it is stated that the bilingual centres should follow a methodological, curricular and organisational model based on principles of the content and foreign language integrated learning, and that they should create and use material for the same purpose (ORDEN 14 febrero 2013, p. 3965). Once again, this could be interpreted as CLIL being suggested as the preferred approach; nonetheless, no explicit acknowledgement to it was made throughout the document. Up until this point in the history of bilingualism in Aragon, there seemed to be indications that CLIL was being proposed, nevertheless these were vague and inconclusive.

In 2018, the 'Modelo BRIT-Aragón' was implemented to regulate the teaching of foreign languages in the region. In this project learners are required to develop their linguistic competence *with* and *through* the foreign languages (ORDEN ECD/823/2018 de 18 mayo, p. 16283), which means that language is used for communication as well as for learning. The project expects students to reach a B2 level in the Common European Framework of Reference for Languages, by the end of the mandatory levels of education. At least 35% of total curricular time should be delivered in the foreign language, time which includes the foreign language subject itself and subjects from "Áreas en Lengua Extranjera" (AELEX). i.e. social and natural science, arts, physical education, amongst others.

Different from its predecessor PIBLEA and the parallel national project MEC-British Council, BRIT-Aragon explicitly mentions CLIL as the preferred approach to be used across schools in the Autonomous Community. In fact, CLIL is regarded as a suitable and appropriate approach that caters for the current global, European and Aragonese educational needs whilst, at the same time, allows students to learn content and develop their language skills to understand and produce messages in a foreign language (ORDEN ECD/823/2018 de 18 de mayo 2018, p. 16286).

From the above, it can be said that, even though it has already been 20 years since features of CLIL were officially introduced in the Spanish context, the approach's relevance and importance have progressively been reinforced as years have passed. However, considering that BRIT-Aragon is the document of reference for teachers in the region, there still seems to be some lack of clarity on the specific aspects which help in the application of the approach. For instance, CLIL's main principles, characteristics, procedures or an integrated curriculum are details missing. Unfortunately, this means that there is still confusion on how to go about the approach. Nevertheless, one thing is certain and it is the fact that CLIL is the suggested methodological approach to be applied in the Aragonese context; being this the reason why, in the next section, a discussion on its principles and relevant characteristics for this investigation is presented.

3.2 Content and Language Integrated Learning (CLIL)

In this section, a comprehensible review of Content and Language Integrated Learning (CLIL) is introduced, considering the aspects which will be later decisive in the design of the assessment instrument.

The term CLIL was created in 1994 by David Marsh and Anne Maljers (Cherro, 2015, p. 51) and can be defined as a content-driven dual-focused educational approach in which a subject and an additional language are used for the teaching and learning of both, the content and the foreign language. The focus falls more on none of the two as, in fact, they are interwoven and find support on each other, even when the emphasis for a particular purpose might be given to one or the other (Coyle, Hood & Marsh, 2012). CLIL has been developed

so that it tackles today's world's demands whilst it caters for the development of skills for managing change and adaptation.

What separates CLIL from other bilingual approaches is that CLIL seeks the construction of new knowledge through the development of 21st Century skills, such as solving problems and developing new ideas. This is achieved by means of a carefully planned integration between contextualised content and communicative skills in a foreign language. (Coyle, 2002, p. 45 in Coyle, Hood, & Marsh, 2012, p. 6). Bearing this in mind, it is sensible to think that learning through CLIL does not mean substituting students' mother-tongue with a foreign language, as teaching is not done *in* a foreign language, but *with* and *through* a foreign language (Eurydice, 2006, p. 8 in Coyle, Hood, & Marsh, 2012, p. 3).

Learning *with* and *through* the language signifies that meaningful long-lasting knowledge is constructed when students engage in significant communicative exchanges with themselves and others. This is what Wells (1999 in Coyle, Hood, & Marsh, 2012, p. 35) describes as *dialogic learning,* a view of learning which requires students to be taught and trained in communicative functions such as purposefully asking and answering questions, discussing, debating, giving feedback, etc. Meticulous planning is required to identify the cognitive and knowledge processes associated with the content, as well as to distinguish the essential language functions and skills needed to complete these tasks successfully.

The above mentioned principles are the core foundations of CLIL which are brought together in the *4Cs Framework* discussed below.

3.2.1 The 4Cs Framework

Despite the fact that there are other frameworks of CLIL, such as Mohan's knowledge structures (1986, in García, 2013) or the systemic functional linguistics (Llinares, Morton & Whittaker, 2012), the 4Cs Framework (Coyle, Hood & Marsh, 2012) has been chosen because the design of the instrument will be mainly based on the *Language Triptych* proposed in it and explained later in this chapter. The 4Cs Framework consists of the alliance of *content, cognition, communication* and *culture* as the bases of the approach, as shown below:

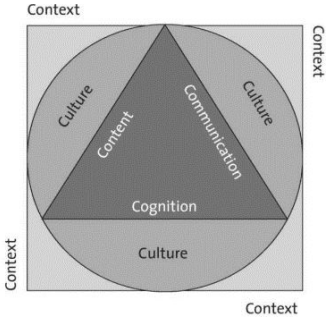

Figure 1. The 4Cs Framework, taken from Coyle, Hood, & Marsh (2012, p.41)

In this framework, *content* refers to the subject matter, *communication* to language learning and using, *cognition* to learning and thinking process, and *culture* to developing intercultural understanding and global citizenship. It is believed that effective CLIL happens as the result of the carefully planned connections amongst these elements to meet the learning objectives (Coyle, Hood, & Marsh, 2012, p. 41). Understanding that *communication* works in convergence with the other components conditions the way this should be analysed. Therefore, language cannot be regarded as a stand-alone component, instead, influence from the other three elements must be determined so that a more complete picture of how language works in the approach can be built. Based on this, in the following paragraphs these different constituents of the *4Cs Framework* will be discussed, making special reference to their relationship with *communication*.

3.2.2 Content, Cognition, Culture and Communication

Content is heavily influenced by the context of the learning institution, which means that the source is flexible and varied, so it may come from a curriculum or be based on a particular theme (Coyle, Hood, & Marsh, 2012). The connection between content and cognition is found in that content is tackled from a social-constructivist perspective, which means that learning is the product of cognitively engaging activities which should be interactive, mediated and student-led. This is done through appropriate scaffolding and in a setting that allows what Vygotsky (1978 in Coyle, Hood & Marsh, 2012, p. 29) called a Zone of Proximal Development (ZPD). This describes the kind of learning that is *"challenging yet potentially within reach of individual learners on condition that appropriate support, scaffolding and guidance are provided"*. This means that it is the teacher's job to set a balance amongst a cognitively challenging atmosphere, an appropriate support of how the content is dealt with, and the language needed to perform the tasks successfully. Precisely, an essential part of this model is the interaction amongst learners and the teacher, as it is in the meaningful communicative exchanges where learning takes place. Therefore, students need language to understand the content, but also to articulate what they know, want to learn, are learning and have learnt; here is where the connection between content, cognition and communication lies.

Consequently, planning requires the teacher to determine the content and a range of thinking, problem-solving and communicative skills which allow students to interpret, understand, reason, articulate, interact, create, etc., their own learning (Coyle, Hood, & Marsh, 2012, p. 29). This will allow students to develop meaningful life skills which they can apply, not only in their future academic studies but also in other aspects of their lives. This view of content, cognition and communication working together can be related to Bloom's Taxonomy's lower-order thinking (remembering, understanding and applying) and higher-order thinking (analysing, evaluating and creating), cognitive knowledge dimensions (Coyle, Hood, & Marsh, 2012, p. 30).

As it can be seen from the above, in CLIL communication is interwoven with content and cognition, however it is important to consider where this alliance is framed within: culture. Even though culture is generally defined as the way we see the world and language as what we use to articulate this interpretation, in CLIL, *culture* is assumed differently. In fact, the integration of culture in the learning process focuses on the development of intercultural awareness and understanding, rather than the knowledge about different cultures. This means that cultural understanding may go from the way students establish meaningful interactions amongst themselves using the foreign language to interacting with others beyond the classroom. In other words, the cultural aspect in CLIL pursues the personal development of an understanding of cultural diversity whilst using one's language to effectively communicate within one's and others' cultures.

In conclusion, communication is the system *with* and *through* which content, cognition and culture take place. Though all the components in the framework should be regarded as equally important, the role of communication is decisive in achieving the learning objectives. In fact, the significance of communication in CLIL lies in the fact that content, cognition and culture cannot take place without thorough planning of the language needed to understand, articulate and exchange ideas with oneself and others. Therefore, in order to determine the specific elements of communication that should be considered when designing the assessment instrument, a section in communication only is presented below.

3.2.3 A closer look at Communication

According to Coyle, Hood & Marsh (2012), communication refers to language use and language learning, that is, communication's main role is to support content learning, as well as the development of better communicative skills. This means that for students to be able to advance in their learning of the language, they need to develop their understanding and use of it through their control over different grammatical forms (p.33), as well as their awareness of genre, style and correctness, which will allow them to understand others and be understood (p.34). Bearing in mind the social-constructivist nature of the approach, communication should be regarded then, as the way in which language is used to establish meaningful interactions with oneself and others, in order to construct knowledge.

A concept that can be used to interpret language in this way is the language triptych (Coyle, 2000, in Coyle 2012, p. 36), a model that establishes connections between content and language objectives by considering cognitively demanding content and language learning and using. The language triptych allows for the analysis of language from three interrelated perspectives: language *of* learning, language *for* learning and language *through* learning (Coyle, 2000, in Coyle 2012, p. 36).

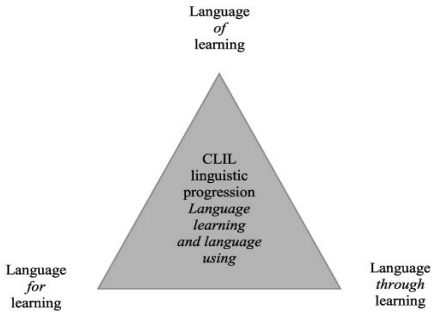

Figure 2. The Language Triptych, taken from Coyle, Hood & Marsh, 2012, p.36

As seen above, the roles of language are varied, yet they work together so that linguistic progression takes place. The first category is language *of learning*. According to Cherro (2015) and Aregall (2015), it is the one needed for learners to access basic concepts and skills relating to the subject matter or topic. Coyle, Hood, & Marsh (2012) affirm that this responds to the linguistic demands of the content, fulfilling certain functions and notions, whilst Gutierrez, Durán & Beltrán (2012) contend that it may include specific vocabulary, dates, and verbs in the past. In consequence, it could be said that language *of* learning refers to a selection of grammatical forms and lexical items and sets, which are relevant to the content and that help students be better able to use the language appropriately to convey and articulate meaning. In other words, this language responds to the content's linguistic demands.

A second category, language *for* learning, is defined by Cherro (2015) and Aregall (2015) as the language needed to work in a foreign language environment which, if students are not able to understand, learning can not take place. Coyle, Hood, & Marsh (2012) state that this is language that students need to be supported on so that they can develop essential skills for the CLIL classroom, such as doing pair work, debating or enquiring; this is language that enables them to learn, help others to learn and be supported by the teacher. Gutierrez, Durán & Beltrán (2012) affirm that this may include classroom language, expressing similarities and differences, following instructions, writing a diary, etc. Thus, it can be said that language *for* learning refers to the functional language needed by students to be able to develop communicative skills to operate more independently in the foreign language whilst constructing their learning.

A final type is language *through* learning which Cherro (2015) and Aregall (2015) refer to as students' active involvement of language and thinking so that learning takes place. Coyle, Hood, & Marsh (2012) describe it as the language that learners use when they are encouraged to articulate their understanding of content, all of which helps students reach a deeper level of learning. Gutierrez, Durán & Beltrán (2012) claim that it may include reading skills, asking and answering questions, world map location skills, dictionary skills, etc. In other words, it is the language that backs students whilst tackling the cognitive demands of the CLIL

classroom. Hence, it can be said that this is the active mindful language which helps students process, construct and make sense of their learning.

As a way to synthesise what appropriate communication in a CLIL environment is, the following table with summarised statements is presented.

Table 1

Language support assessment criteria

Theoretical principle	Items
Language *of* learning	Key vocabulary on the topic.
(Content's linguistic demands)	Key useful phrases to express ideas on the topic.
	Grammatical forms relevant to the topic.
	Functional language linked to the grammar focus.
Language *for* learning	Functional language to interact with others
(Language skills to operate)	Functional language to interact with the material
	Language for classroom activities
	Language to interpret the content
Language *through* learning	Opportunities to extend language
(Language to articulate own take on the content)	Opportunities to recycle language at a higher level
	Opportunities to independently look for language
	Opportunities to reflect on and practise with language

The above table tries to present an approximate yet comprehensible relationship between CLIL's principles on communication and more observable and evaluative descriptors which will be used in the design of the assessment instrument.

A final consideration on the matter of communication in CLIL is what Cummins (1984, in Aregall, 2015) defined as Basic Interpersonal Communicative Skills (BICS) and Cognitive Academic Language Proficiency (CALP). The first refers to the development of social, conversational language used in oral communication, whilst the latter is related to the improvement of the language used in academic contexts and that is normally associated with higher-order thinking skills, such as analyse, hypothesise, etc. A CLIL learning environment is supposed to set the conditions for both these skills to be developed. This means that appropriate communication in CLIL should provide students with opportunities for interacting and exchanging ideas using more social language, as well as proposing activities which hone their use of more abstract academic language. These two descriptors will be used in the design of the assessment instrument so that the appropriacy of language support given in CLIL textbooks is gauged.

From the discussion above, it can be seen that communication in CLIL is a complex component of the approach. Language should not be simply defined as aspects of a foreign language that students need to learn but, instead, it should be regarded as a continuously evolving means of oral and written communication through which they dialogically and interactively construct their own learning based on a particular content. Understanding that communication is a mosaic construct reinforces the fact that language support given in the CLIL classroom has to be meticulously planned and should not be overlooked as the success of a favourable application of the approach depends on it, as much as it depends on the other interwoven components.

Having discussed CLIL and its principles, which are relevant for the design of the assessment instrument, in the following section a brief discussion on CLIL textbook design is presented.

3.3 CLIL textbook design

In this section the main characteristics of a CLIL textbook will be discussed, as well as its relevance in the specific learning environment.

Textbooks can be regarded as the pathway on which students organise their learning both, inside and outside the classroom (Hutchinson & Torres, 1994 in García, 2015). It can also be said that textbooks are the books that include all the visual, written and oral materials in a written form (Martín & Rascón, 2015). Whilst it is true that textbooks are useful and valuable materials to be incorporated in the learning dynamic, teachers should be the ones who decide the potential and usefulness of the material (Codina, 2019). This means that it is the teacher's responsibility to determine whether or not a textbook is suitable for the purpose of the class, considering among others, their theoretical appropriateness. Indeed, if chosen and used accordingly, a textbook can be a great asset for the learning environment. In the case of CLIL textbooks, there are several aspects to be scrutinised beforehand; those pertaining to Communication are discussed below.

Whilst translated and authentic materials can be useful in some approaches, according to Czura (2017) and Martín & Rascón (2015) the material used in the CLIL classroom has to be pedagogically adapted and designed so that the cognitive, linguistic and cultural dimensions of the approach are covered accordingly. Therefore, it can be said that a textbook's communicative activities have to be adapted so that language of, for and through language are provided, as well as opportunities to develop BICS and CALP.

Czura (2017) defines some guiding principles for the development of CLIL learning material. Mentioning only those relating to communication, first of all, it is said that there has to be a clear *integration of content and language*, this concept stands that there must be opportunities for reading, listening, writing and speaking, as well as clear information on grammar, vocabulary and pronunciation.

Another principle to consider is the necessity to incorporate a *focus of productive skills and communication.* Dalton Puffer (2007, in Czura, 2017) affirms that research suggests that there is not normally an adequate balance between the amount of input given and the productive tasks undertaken. It is then advised that textbooks should provide students with opportunities to put into practice their productive skills and academic discourse competence through project work, case studies, debates and discussion topics with a clear goal, real-life interaction and negotiation of meaning.

A further consideration is the need for *extensive vocabulary practice* which emcompasses the presentation, practise and retention of a wide range of vocabulary and specialist terminology, considering the necessary opportunities for supporting the learning of such through glossaries, picture dictionaries, phonetic transcription and practical vocabulary activities. Finally, *enhanced visualisations of meaning*, refers to an array of visual aids that helps with the clarification of meaning. This can be done through timelines, illustrations and diagrams, this also caters for different learning styles and facilitates deeper understanding of the content.

Having discussed the above principles on the development of CLIL material, it can be said that the selection of an appropriate textbook is a decision that should be made studiously. The principles discussed above are believed to represent the essential characteristics that a teacher should look for in a CLIL textbook to determine if appropriate language support is being given. Therefore, these, along with those discussed in the CLIL's principles section, will be used in the design of the assessment instrument, as it is believed that the combination of both provide a solid theoretical background to determine the criteria to be used for the analysis.

In the following chapter, information relevant to the creation of the instrument and the reasoning behind its creation is provided.

4. Methodology and Justification

In this chapter, details on the specific theoretical background that supports the design of the assessment instrument is presented in a first section. In a second, the justification for the investigation is provided.

4.1 Methodology

The following paragraphs present the theory behind the design of the instrument and its application. First, details concerning the design of the instruments are discussed, so that the bases and justification of its design are set. This includes a clarification on the different levels of material assessment and a discussion on the types of assessment in pedagogical material. This clarifies the level of depth up to which the instrument is intended to reach and the

specific category the instrument will fall into. Finally, to close this section, a definition of checklists will be given, as well as the reasoning behind the choice for the purpose of this investigation. In a second section of this chapter, details on how the designed instrument will be administered to assess the level of appropriateness of two CLIL sample units by known publishers is explained.

According to Harwood (2013, in Martín & Rascón, 2015), when assessing pedagogical material there are three levels of depth of research: content, consumption and production. Content relates to the analysis of what is included or omitted in the materials and the pedagogical beliefs that support them; consumption tackles the actual use of materials by teachers and learners; and production relates to the design, writing and distribution of materials. Since the instrument's main focus is the presence or absence of qualities in a textbook regarding communication, it can be said that the level of depth of research is of content.

A further consideration in the design of the instrument is the type of assessment being conducted. Cruces (2015) identifies two main types of assessment in pedagogical materials, analysis and evaluation. The first is understood as the procedures which aim at discovering a textbook's specificities, and the latter is conceived as the judgement of its qualities. Given the fact that the assessment instrument being designed in this paper is expected to identify the qualities of a textbook regarding the language support it offers and, at the same time, use the obtained information to make judgements on whether or not the support offered is appropriate for the CLIL's Aragonese context, it can be said that the type of assessment intended would fit both types, analysis and evaluation.

Having defined the level of depth and the type of assessment, an aspect to be determined at this point is the assessment instrument itself. Whilst there are different assessment instruments available, a well-known and widely used for the purpose of assessing teaching material is the checklist. It consists of items in the form of statements which determine the presence or absence of a particular quality. In the case of this study, the statements will reflect the fundamental characteristics regarding Communication that a CLIL material should have. These were discussed in section 3 and will serve as the foundation that establish what appropriateness of language support is.

According to López (2016) using a checklist is a useful and appropriate instrument to select, adapt and evaluate textbooks, as it allows teachers to analyse the material's suitability in the same way more experienced teachers would perform this task. This assessment instrument can be particularly helpful for novice teachers (López, 2016), not to mention those experienced but non-CLIL teachers who have had little exposure to the approach's main characteristics regarding communication. Mc Grath (2006, in López, 2016) affirms that another advantage in the use of checklists is that they allow for a contrastive analysis to be performed, whilst making it possible to obtain a significant amount of information in a

relatively short period of time. Another important advantage is that the layout also allows informants to have an easy format to analyse and report the information obtained after the application of the assessment instrument.

One of the disadvantages identified in checklists designed to evaluate textbooks (Demir & Ertas, 2014 in López, 2016) is that there might be omission of certain context bound criteria. However, the checklist being designed in this paper is opened to adaptations to suit specific contexts and allows its users to adjust aspects of it to cater for more specific needs.

After having discussed what the instrument is and the theoretical background that supports it, this second section intends to set an example of how the assessment process is to be carried out using the assessment instrument.

The material on which the checklist will be trialed comprises two sample units from well-known publishers: Santillana-Richmond and Cambridge University Press. Both sample units are for year 5 of primary school and the subject is natural science, which has been reported to be on the top two most popular CLIL subjects across Spain (Codina, 2019, p. 7). To determine the level of appropriateness of the language support given by both, students' and teacher's books will be scrutinised. This will allow for a more thorough data collection on whether or not the qualities and characteristics are present or absent. Once the results are obtained, a final judgement will be made and a commentary on the possible identified strengths and weaknesses will be presented.

4.2. Justification

CLIL becoming a popular approach across Europe and around the world (Codina, 2019; López, 2016; Coyle, Hood & Marsh, 2012) has created a high demand for CLIL material, especially textbooks. However, the complex nature of the approach and its relatively recent implementation have made it a difficult task for teachers to find theoretically sound textbooks that are truly designed based on the approach's principles. In fact, literature suggests that there are pitfalls, especially on the integration of content and language, a basic foundation of the approach. An example of this is the investigation carried out by Martín and Rascón (2015) who, after analysing a corpus of 25 books from different subjects, years, and publishers, concluded that there is an insufficient presence of linguistic objectives and that there is a noticeable need for research on current commercially available books. This need is reinforced by the fact that literature indicates that textbooks play an important role in the effective implementation of the approach (Codina, 2019; López, 2016; García, 2015; Cruces, 2015; Martín & Rascón, 2015; Aregall, 2015) which also goes without saying that CLIL has now been officially endorsed as the preferred approach in the Autonomous Community of Aragón. All this situation makes it imperative to create mechanisms to determine whether or not the available material follows the CLIL's principles and, consequently, improve the chances of a more effective implementation to happen.

In the context of the above, a problem arises: teachers' knowledge of and training in CLIL might be deficient (Custodio, 2019), limiting their possibilities of creating these mechanisms which can help them determine how appropriate the available material is. As a matter of fact, the lack of theoretical knowledge on a particular methodology or approach has been identified as the main factor responsible for making teachers rather mechanical workers without critical or reflexive capacity (Pagès, 1994 in Cruces, 2015). In the particular case of CLIL, Cruces (2015) confirms that, due to their unfamiliarity with the approach, teachers are generally concerned about not knowing what is expected from them in a CLIL learning environment.

In Aragon, according to ORDEN ECD/823/2018 de 18 mayo, to be eligible to teach an AELEX subject, the teacher must be in possession of a B2 certificate in the foreign language; however, no reference is made to previous training in CLIL as a requirement (p. 16288). Considering the known problems regarding textbooks, this may mean that whilst experienced and trained teachers in CLIL might be able to identify, assess and compensate for the flaws in available CLIL textbooks for Primary Education in Aragon, less experienced, newly qualified and untrained teachers in CLIL might not be in the same position. In fact, these might find they do not have the necessary tools to perform such crucial tasks and, instead, they might be following available textbooks rather uncritically. Besides, this can also mean that specialised teachers might be adding to the problem of focusing more on their area of expertise (content), overlooking the other equally important component of the approach (communication).

In the light of the above mentioned, the assessment instrument being proposed in this investigation comes to serve as an effective yet easy-to-implement tool to help teachers with a limited background knowledge of CLIL to determine the level of appropriateness of language support given in commercially available textbooks. By doing this, the chance of a more successful application of the approach across the Autonomous Community is expected to increase and, therefore, the quality of the teaching to improve. Likewise, through the use of the tool, awareness of the approach's principles is expected to raise in teachers with little or no experience in CLIL across Aragón, increasing their interest in wanting to know more about it and, in the whole, making them become more acquainted with it so better practices can be promoted.

5. Design and Analysis of Materials

In this chapter, the resulting design of the assessment instrument is presented, and two examples of its application on two commercially available CLIL textbooks are performed.

5.1 Design of the assessment instrument

For the design of the assessment instrument, several considerations have been taken into account. First, the methodological principles that support the design of the instrument itself

and what will represent its content, i.e. the theoretical revision on CLIL's principles on communication.

Regarding the layout of the checklist, it consists of sections which try to organise the information in a logical way, progressively guiding the user towards the making of a final decision on how appropriate the language support provided is. A first section at the top of the page is used to fill in the information related to the book being assessed i.e. name, publisher, year, unit, etc. This will help the user keep an easily identifiable record of the analysis performed. The following section presents the instructions for the assessment and the list of descriptors, organised in blocks: language of learning, language for learning, language through learning, BICS & CALP, and CLIL material design. Below, a summary of the results section will allow the user to compute the data obtained in a more compact view which will facilitate its later interpretation. An observations section will give the user the opportunity to make specific comments on the blocks' and descriptors' strengths and weaknesses. Finally, an informative table presenting the different levels of appropriateness of language support and the requirements for each is presented so the user can make reference to this when interpreting the results obtained. This will help the user make a final decision on whether or not the material is appropriate, communication wise. Having discussed the layout of the checklist, a more detailed analysis of its content is presented in the following paragraphs.

After revising the theoretical principles of CLIL relating to communication and the guiding principles on CLIL material design, resulting criteria have been formulated and presented below. The statements below have been created so that they are more observable and measurable descriptors of the theoretical aspects discussed in chapter 3. These descriptors will serve as items on the checklist.

Table 2

Descriptors of language support in a CLIL textbook

Reference to theory	Descriptor
Key vocabulary on the topic.	1. There is enough key vocabulary related to the topic to allow students to understand and communicate ideas at length.
Key useful phrases to express ideas on the topic.	2. There are relevant useful phrases which would help students express their own ideas on the topic.
Grammatical forms relevant to the topic.	3. There is reference information on accurate meaning and use of grammatical structures relevant to understand and express one's ideas on the topic.
Functional language linked to the grammar focus.	4. There are expressions, linked to the grammatical structures, which can help students carry out interactive tasks.

Functional language to interact with others	5. There are general commands which can help students establish meaningful more natural exchanges with others.
Functional language to interact with the material	6. There are general commands which can help students interact with the different materials of the class.
Language for classroom activities	7. There are specific commands to help students establish more meaningful natural exchanges with others during tasks.
Language to interpret the content	8. The language presented supports students with the cognitive demands of the unit.
Opportunities to extend language	9. There are freer activities which allow students to get to know more about the topic.
Opportunities to recycle language at a higher level	10. There is a coherent progress in the level of challenge of activities which aims at consolidating the use of language skills.
Opportunities to independently look for language	11. There are activities which cater for the development of learning to learn skills, communication wise.
Opportunities to reflect on and practise with language	12. There are moments for self- and peer correction on one's performance of communication that allow for reflection on use of language.
BICS - Basic Interpersonal Communication Skills	13. There is language for social communication.
CALP - Cognitive Academic Language Proficiency	14. There is language for academic purposes.
Integration of content and language	15. There are activities for language development skills (reading, listening, writing and speaking). 16. There are activities to raise students' awareness of grammar, vocabulary and pronunciation.
Focus on productive skills	17. There is an adequate balance between input and output.
Extensive vocabulary practice	18. There are activities to present, practice and help consolidate vocabulary.
Enhanced visualisations of meaning	19. There are illustrations that help convey the meaning of language in the unit.

The descriptors above are intended to provide a preliminary groundwork on what appropriate language support should be in a CLIL textbook. However, as mentioned in the previous chapter, these are open to adaptation, depending on the user's purpose. For the case

of the present investigation, these descriptors represent the items that have been used in the assessment instrument created (Appendix 1) which has been used to analyse the sample textbooks.

In order to determine whether or not the language support items above are present or not, a qualitative evaluation through a checklist is proposed. In the context of assessing pedagogical material, Cruces (2015) defines qualitative checklists as those whose judgement are based on the material's attributes. This also means that, instead of using numbers, a grading scale based on characters will determine if there is evidence of the presence of the features described in each item. The table below shows this in more detail.

Table 3

Grading scale on checklist

Characters	Items
P	P stands for present. This means that the item is present and fully meets the criterion. No modifications or adaptations to the material are needed as it fits the CLIL's communication principle's standard.
PP	PP stands for partially present. This means that the item is present but does not meet the criterion fully. This may mean that the feature would have to be improved by adding elements to the material or that modifications are needed so that the material could better meet the CLIL's communication principle being assessed.
NP	NP stands for not present. This means that the item is not present as there is no evidence in the material that shows it has been taken into account in its design.

The user will employ the characters on the grading scale above to signal the descriptors' level of presence or absence in the material being assessed. At the end of this process, the resulting list of characters will provide the user with meaningful information that can be reviewed and interpreted at a glance. For that purpose, the user can consult the interpretations below, which will help them translate the resulting information into whether or not the assessed textbook provides appropriate language support according to the CLIL's principles on communication.

Three different levels of appropriateness have been defined: appropriate, modifiable and not appropriate. These are conceived as ways to interpret the results and, therefore, determine the level of appropriateness of the language support given by the textbook on communication. For a textbook to be categorised in one of these levels, it has to fulfil some conditions and meet a minimum percentage of the established criteria based on the theoretical background. Details on the specific conditions are given below.

A first interpretation of the results is that the material is appropriate. This would mean that there is enough evidence to conclude that the assessed textbook adheres to the CLIL's principles on communication and that it provides the appropriate level of language support

needed in a CLIL learning environment. For this to happen, at least, 80% of the criteria must be fully met, not only throughout the checklist but also in each category. This means that, for the material to be considered as suitable, all categories must have a significant majority of descriptors graded as present. In more specific terms, at least three out of four of the items in each of the language categories (of, for and through learning), both items for BICS and CALP, and four out of the five items in CLIL material design must be present. In consequence, it could be said that making sure that the material covers a good percentage of all the necessary theoretical aspects reassures the fact that it has been designed based on CLIL's principles on communication. This means that appropriate language support for a CLIL learning environment is provided and, as a result, the user can regard the assessed textbook as appropriate, language wise.

A second interpretation of the results is that the material is modifiable. This would mean that a considerable amount of modifications and adaptations might be needed so that the textbook can comply with CLIL's principles on communication and, therefore, provide an appropriate level of language support. It would be at the user's discretion to decide whether or not they have the resources to compensate for the identified flaws. This category is given to materials which can only cover up to a minimum of 60% of the criteria, not only throughout but also in each category. This means that, for the material to be considered editable, almost two thirds of the descriptors in each category have to be graded as present. In other words, at least two out of the four descriptors in each of the language categories (of, for and through learning), both items for BICS and CALP, and three out of the five items in CLIL material design must be present. This percentage is considered to represent a level of language support that, if not fully appropriate, makes the material potentially eligible. Thus, it could be said that appropriate language support for a CLIL learning environment is likely to be provided by material that has been categorised as modifiable, provided the necessary modifications are adequately done,

A third possible interpretation of the results is that the material is considered to be not appropriate. This would mean that the material does not comply with CLIL's principles on communication and, as a consequence, its use would not be advisable as it would not be encouraging or promoting the development of appropriate communicative skills necessary in a CLIL learning environment. Assessed materials whose results show that these do not cover at least 60% of the criteria throughout the checklist and in each individual category would fall into this category. If this is the case, this would mean that the textbook does not follow CLIL's principles on communication and, as a consequence it is understood that the material does not provide appropriate language support.

Examples on how to use the instrument and the just explained interpretations are given in the section below.

5.2 Analysis of CLIL textbooks

In this section, details on how the assessment instrument has been used to analyse the level of appropriateness of language support of two sample units of two commercially available textbooks are given. A later discussion will consider specific information on how the results have been obtained and their interpretation.

The designed instrument has been tested on Students' and Teacher's books of *Natural Science* level 5 by Cambridge University Press (2019) and *Natural Science Learning Lab* level 5 by Santillana-Richmond (2019). The sample pages analysed can be found in Appendix 4. The procedure consisted of reading through the material first so that a general impression of its design could be formed. Then, taking as reference each individual item on the checklist, evidence of its presence was looked for throughout the teacher's and students' books. Using the grading scale, a character would be used to signal the level of presence of each descriptor. At the end, the summary of the results section at the end of the checklist was filled to get a simplified version of the findings for their interpretation. In order to do this, the reference table containing the minimum requirements for each category was used. For each book, the observation section of the checklist was used to give detailed information on the findings. The resulting outcomes from the trial tests can be seen on Appendixes 2 and 3.

In both cases, the instrument proved to be efficient in identifying and assessing the books' characteristics regarding language support for a CLIL environment. This showed to be of help in making decisions on whether or not the assessed textbook was suitable, communication wise, to be used in a CLIL classroom. Though each textbook scored differently, in both cases, the materials showed to provide insufficient language support which meant that their use was unadvisable.

The design of both books showed a distinct tendency to focus on the clarification of individual lexical items and a noticeable disregard for the use of explicit information on grammar or pronunciation. What is more, even though there was some evidence of sample useful phrases to express one's ideas on the topic, these tended to be distinctively limited. This means that these two books considered some of the aspects of language of learning but omitted others. Regarding the language for learning, these books scored poorly. Whilst in both books the language provided for any type of interaction was scarce, the Santillana-Richmond book showed an additional problem and it was that some of the language samples seemed to be disconnected from the function being encouraged in the task. Overall, none of the books provided appropriate language support for this aspect of communication.

In relation to language through learning, both books seemed to provide students with opportunities to get involved in freer activities which would allow them to get to know more about the topic. An important difference to notice here is that, whilst the

Santillana-Richmond book devised a moment of the unit for self-correction and self-reflection on one's progress, the Cambridge one included more activities that would help students improve their learning to learn skills. Another difference to point out is the balance between BICS and CALP. The Cambridge book incorporates some language for social interactions as well as some for academic purposes, whereas the Santillana-Richmond only focuses on the latter.

Finally, an aspect in which both books seemed to have scored relatively well is in the CLIL material design section of the instrument. The highlights could be found in the balance between input and output activities, the provision of activities for the development of reading, listening, writing and speaking, and the presentation, practice and consolidation of the vocabulary. An interesting aspect here is that both books' illustrations seemed to focus on the clarification of the lexical items, overlooking exposition of the other aspects of language.

Generally speaking, the flaws in both books were plenty, meaning that very little consideration of the CLIL's principles on communication have been taken into account in their design. According to the information obtained after the use of the instrument, their use is unadvisable as they do not provide an appropriate level of language support for the CLIL learning environment.

5.3 Limitations on the design and the analysis

It would have been of benefit for this investigation to look into the social constructivist theories of teaching and learning that support CLIL, as its consideration would have had an influence on the design of the instrument. In fact, some descriptors to measure this could have been added. This would have allowed the instrument to be enriched by, not only items that would be used to measure the presence of social-constructivist trades in the design of the material, but items that would have also allowed for a deeper analysis to be performed on the results, exploring the possible theoretical backgrounds that support the design of commercially available textbooks for CLIL.

Another limitation that could be mentioned is the limited access to the available CLIL textbooks. It would have been interesting to analyse not only the students' and teacher's books but also all the materials that are provided with this. It would have given the results more relevance as a wider sample for each book would have been put to test. A more detailed look at the books would have been useful as it could have unveiled whether or not there is a presence of dedicated sections to support teachers and students with the necessary language of, for and through learning, for example. If that had been the case, more significant conclusions could have been drawn on this matter which has proven to be a major flaw in the design of CLIL textbooks.

A final limitation has to do with the amount of samples on which the instrument was tested on. Applying the instrument on a wider variety of books would have allowed the

investigation to have more solid data which could have been used to draw more compelling conclusions, not only on the level of language support given on commercially available textbooks but also on the design of the material itself, allowing for the identification of areas for improvement.

6. Conclusions

In this chapter, final conclusions resulting from the process of revision of the relevant literature, the design of the assessment instrument and its trial will be drawn.

First of all, it can be said that it has been possible to gauge the level of appropriateness of language support given by commercially available textbooks through the design of an assessment instrument based on a comparative analysis of the characteristics present in the books and what the theory stands, communication wise. Whilst the revision of the theory was crucial in determining the criteria of assessment, careful thought of the design allowed for the instrument to be user-friendly. It is believed that, not only does the material accurately assess the characteristics of a textbook on language support, it also allows the user to organise the collected data in a way that is comprehensible and easy to be interpreted. The latter is thought to be helpful in allowing the user to make a final judgement on the material's appropriateness of language support. Consequently, it is believed that the main objective of this investigation has been achieved.

It can also be said that the revision of the theoretical foundations of CLIL has confirmed that the approach is a complex system of interrelated components that find support on each other to set a meaningful learning environment. This allows for the development of students' communicative, cognitive and life skills. Therefore, this means that, when working with CLIL, a consideration of the interdependence of its components is needed. However, communication in CLIL is a complex component itself which needs the consideration of several factors, that include the elements of the language triptych (language of learning, language for learning and language through learning), as well as BICS and CALP. In the particular case of CLIL material design, the theoretical background suggests that there are specific and essential principles to bear in mind when designing instructional material for the CLIL classroom; this includes the introduction of activities for language development as well as those for raising students' awareness of the language's systems, amongst others seen in chapter 3. However, literature has also informed that it is the communication component that is regularly overlooked in commercially available material, showing that the aspects before mentioned tend to be absent or deficient. After the application of the assessment instrument, the results show that this is still the case as none of the two sample units evaluated have shown enough evidence of the presence of key CLIL characteristics on communication to cover at least 80% of criteria. In consequence, it was determined that the sample units assessed did not provide the appropriate language support needed in a CLIL learning

environment. What is even more interesting is that the samples did not get to cover at least 60% of the criteria to be considered modifiable. It is indeed concerning that, after 20 years of the implementation of the approach in the European context, the commercially available material does not provide the necessary language support which can allow teachers and students to create adequate learning environments that really promote the meaningful learning with and through the foreign language.

Certainly, more exploration in a wider sample of books and their supplementary material is needed as it would be useful to collect more conclusive evidence which can lead to the drawing of more decisive conclusions. However, it is believed that the designed tool can be used and/or modified for future investigations in the field as it has shown to be effective in detecting those aspects of communication which determine how much language support a textbook provides. Besides, not only do its descriptors reflect the theory but also they depict the relationship amongst them, which happens to be crucial in demonstrating whether or not the material under scrutiny offers all the support needed in a highly-demanding cognitive learning environment as CLIL's. What is more, the descriptors have been written using uncomplicated language so that users of different backgrounds can feel confident when using it. Moreover, the design of the material has proven to be effective in allowing its users to make informed critical judgments on CLIL textbooks, deciding whether or not it can be eligible for its application in the classroom. Therefore, it is believed that the instrument designed can be applied in further explorations of language support given by CLIL textbooks for primary education.

At this point, it is important to say that a successful application of the approach requires thoughtful planning and consideration of the relationship amongst all the factors. This will increase the chances of providing students with appropriate language support which will, as a consequence, allow students to improve their communicative skills whilst being cognitively engaged in dialogic activities based on a certain topic. Providing teachers with a tool that can help them make informed choices of the material they bring into the classroom is believed to be contributing with the performance of better practices. In the case of Aragon, in spite of the fact that inservice teachers have the support of the Centro Aragonés de Lenguas Extranjera (CARLEE), those who have not had access to the training in CLIL offered by it will find this tool useful and helpful. Based on this, it could be said that the use of this instrument could help compensate for the lack of theoretical specificity identified in the BRIT-Aragon project, as seen in chapter 3.

Finally, it is important to stress that the designed instrument does not intend to represent a definite version of it, as it is believed it represents an approximation of what could be done. This means that, as mentioned in the limitations above, it could be improved by refining elements and adding descriptors that consider, for example, the social-constructivist nature of the approach.

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ORDEN ECD/823/2018, de 18 de mayo, por la que se regula el Modelo BRIT- Aragón para el desarrollo de la Competencia Lingüística de y en Lenguas Extranjeras en centros docentes públicos no universitarios de la Comunidad Autónoma de Aragón. Boletín Oficial de Aragón, 101 § 16282 (2018).

Appendixes

Appendix 1. Assessment instrument, Checklist

CLIL Language Support Assessment Tool

Publisher: **Name of the book:**

Subject: **Year:** **Unit to be assessed:**

Instructions: Choose a unit from the book you want to assess. Use the criteria below to check the presence or absence of CLIL's principles on communication in it. Next to each statement below, use *P* to indicate that the item is appropriately present, *NP* to signal that the aspect is missing or *PP* to signify that the item is present but not adequately. Use the summary of results sections to write the number of items found in each category and the observations section for specific or further comments.

	Language *of* learning	
1	There is enough key vocabulary related to the topic to allow students to understand and communicate ideas at length.	
2	There are relevant useful phrases which would help students express their own ideas on the topic.	
3	There is reference information on accurate meaning and use of grammatical structures relevant to understand and express one's ideas on the topic.	
4	There are expressions, linked to the grammatical structures, which can help students carry out interactive tasks.	
	Language *for* learning	
5	There are general commands which can help students establish meaningful more natural exchanges with others.	
6	There are general commands which can help students interact with the different materials of the class.	
7	There are specific commands to help students establish more meaningful natural exchanges with others during tasks.	
8	The language presented supports students with the cognitive demands of the unit.	
	Language *through* learning	
9	There are freer activities which allow students to get to know more about the topic.	
10	There is a coherent progress in the level of challenge of activities which aims at consolidating the use of language skills.	
11	There are activities which cater for the development of learning to learn skills, communication wise.	
12	There are moments for self- and peer correction on one's performance of communication that allow for reflection on use of language.	
	BICS & CALP	
13	There is language for social communication.	
14	There is language for academic purposes.	
	CLIL material design	
15	There are activities for language development skills (reading, listening, writing and speaking).	
16	There are activities to raise students' awareness of grammar, vocabulary and pronunciation.	
17	There is an adequate balance between input and output.	
18	There are activities to present, practice and help consolidate vocabulary.	
19	There are illustrations that help convey the meaning of language in the unit.	

Summary of results

	Level of Presence			**Results**	
Category	**Present**	**Partially Present**	**Not Present**	**Per category**	**General**
Language of learning					
Language for learning					
Language through learning					
BICS & CALP					
CLIL material design					

Observations
Language of learning
Language for learning
Language through learning
BICS and CALP
CLIL material design

Interpretation of results and minimum requirements for each category

	Appropriate		Modifiable		Not Appropriate	
	P	PP/NP	P	PP/NP	**P**	**PP/NP**
Language of learning	*3*	*1*	*2*	*2*	*1*	*3*
Language for learning	*3*	*1*	*2*	*2*	*1*	*3*
Language through learning	*3*	*1*	*2*	*2*	*1*	*3*
BICS & CALP	*2*	-	*2*	-	*1*	*1*
CLIL material design	*4*	*1*	*3*	*2*	*2*	*3*

Appendix 2. Checklist applied to CLIL textbook sample 1

CLIL Language Support Assessment Tool

Publisher: Santillana - Richmond **Name of the book:** Natural Science Learning Lab 5

Subject: Natural Science **Year:** 2019 **Unit to be assessed:** 1 - Living things and cells

Instructions: Choose a unit from the book you want to assess. Use the criteria below to check the presence or absence of CLIL's principles on communication in it. Next to each statement below, use *P* to indicate that the item is appropriately present, *NP* to signal that the aspect is missing or *PP* to signify that the item is present but not adequately. Use the summary of results sections to write the number of items found in each category and the observations section for specific or further comments.

	Language *of* learning	
1	There is enough key vocabulary related to the topic to allow students to understand and communicate ideas at length.	*PP*
2	There are relevant useful phrases which would help students express their own ideas on the topic.	*PP*
3	There is reference information on accurate meaning and use of grammatical structures relevant to understand and express one's ideas on the topic.	*NP*
4	There are expressions, linked to the grammatical structures, which can help students carry out interactive tasks.	*NP*
	Language *for* learning	
5	There are general commands which can help students establish meaningful more natural exchanges with others.	*NP*
6	There are general commands which can help students interact with the different materials of the class.	*NP*
7	There are specific commands to help students establish more meaningful natural exchanges with others during tasks.	*NP*
8	The language presented supports students with the cognitive demands of the unit.	*NP*
	Language *through* learning	
9	There are freer activities which allow students to get to know more about the topic.	*P*
10	There is a coherent progress in the level of challenge of activities which aims at consolidating the use of language skills.	*PP*
11	There are activities which cater for the development of learning to learn skills, communication wise.	*NP*
12	There are moments for self- and peer correction on one's performance of communication that allow for reflection on use of language.	*PP*
	BICS & CALP	
13	There is language for social communication.	*NP*
14	There is language for academic purposes.	*PP*
	CLIL material design	
15	There are activities for language development skills (reading, listening, writing and speaking).	*P*
16	There are activities to raise students' awareness of grammar, vocabulary and pronunciation.	*PP*
17	There is an adequate balance between input and output.	*P*
18	There are activities to present, practice and help consolidate vocabulary.	*P*
19	There are illustrations that help convey the meaning of language in the unit.	*PP*

Summary of results

	Level of Presence			Results	
Category	**Present**	**Partially Present**	**Not Present**	**Per category**	**General**
Language of learning	-	*2*	*2*	*Not appropriate*	***Not appropriate***
Language for learning	-	-	*4*	*Not appropriate*	
Language through learning	*1*	*2*	*1*	*Not appropriate*	
BICS & CALP	-	*1*	*1*	*Not appropriate*	
CLIL material design	*3*	*2*	-	*Modifiable*	

Observations

Language of learning

The language of learning in this unit of the book is rather deficient. There seems to be a tendency to name

On the teacher's book (TB) page (p.) 26, one of the aims for the student's book (SB) p.8 is *"to name some living things"*. However, not enough vocabulary is given to describe the living things in all the pictures. The only two available lexical items in the SB to support this activity are *"snail"* and *"invertebrate*". In the TB on the top left-hand corner of p.26, a *"Key language"* box is provided with a *"Vocabulary"* and a *"Language structures"* sections. Nonetheless, the former does not contain all items in the picture (e.g. sea anemone, clownfish and coral reef are missing) and in the latter, the suggested structures (i.e. *I can see…*, *Snails are invertebrates*) do not seem to suffice the function *"describe"* prompted in the instruction. An additional useful expression (i.e.*"it's got…"*) seems to be missing. (items 1 & 2).

On the TB p.26, one of the aims for the student's book (SB) page (p.) 8 is to *"name some living things"*. This does not match the instruction "How many living things can you describe?"

Language for learning
Throughout the unit, students are asked to compare information (SB p. 13), describe (SB p. 11) agree and disagree with statements (SB p. 17), report information (SB p. 15), amongst others; but the language support given is rather insufficient to help students carry out these tasks with others (items 5 & 7), themselves or the material (item 6). Moreover, it seems as if the main focus falls on the clarification of lexical items and not on providing students with the language needed to perform the requested cognitive demands (item 8)

Language through learning
Even though there are activities that allow students to investigate more about the topic (item 9), these do not seem to be supported with the necessary language so that students can become more independent in their own learning (item 11). The development of the unit seems to be progressive going from what students might know about the topic towards more detailed information on it (item 10). There are opportunities for self-correction through "I can" statements (item 12), however this is not done for peer-correction. A final comment on this is that the expectations of the unit, communication and cognitive demands wise, seem to be rather simple; i.e. name, identify and describe.

BICS and CALP
Even though there are some examples of useful phrases for more academic communication, these seem to be deficient to support students in the development of the activities devised (items 14). There is not evidence of language for more social interactions with others (item13).

CLIL material design
The unit provides students with several inputs and outputs (item 15) and there seems to be an adequate balance between them (item 17). In spite of the fact that there is an activity which exemplifies the basic elements in a sentence on SB p. 14, it appears to be insufficient to allow students to raise their awareness of grammar and pronunciation that could lead to a better use of these (item 16). The main focus throughout the unit seems to fall on vocabulary and its clarification and possible use (item 18). The illustrations provided allow for clarification of the lexical items in the unit, but not the language needed for interactive activities or individual productions (item 19).

Interpretation of results and minimum requirements for each category

	Appropriate		Modifiable		Not Appropriate	
	P	PP/NP	P	PP/NP	P	PP/NP
Language of learning	*3*	*1*	*2*	*2*	*1*	*3*
Language for learning	*3*	*1*	*2*	*2*	*1*	*3*
Language through learning	*3*	*1*	*2*	*2*	*1*	*3*
BICS & CALP	*2*	-	*2*	-	*1*	*1*
CLIL material design	*4*	*1*	*3*	*2*	*2*	*3*

Appendix 3. Checklist applied to CLIL textbook sample 2

CLIL Language Support Assessment Tool

Publisher: Cambridge University Press **Name of the book:** Natural Science Level 5

Subject: Natural Science **Year:** 2019 **Unit to be assessed:** 2 - Ecosystems

Instructions: Choose a unit from the book you want to assess. Use the criteria below to check the presence or absence of CLIL's principles on communication in it. Next to each statement below, use *P* to indicate that the item is appropriately present, *NP* to signal that the aspect is missing or *PP* to signify that the item is present but not adequately. Use the summary of results sections to write the number of items found in each category and the observations section for specific or further comments.

	Language *of* learning	
1	There is enough key vocabulary related to the topic to allow students to understand and communicate ideas at length.	*P*
2	There are relevant useful phrases which would help students express their own ideas on the topic.	*PP*
3	There is reference information on accurate meaning and use of grammatical structures relevant to understand and express one's ideas on the topic.	*NP*
4	There are expressions, linked to the grammatical structures, which can help students carry out interactive tasks.	*NP*
	Language *for* learning	
5	There are general commands which can help students establish meaningful more natural exchanges with others.	*NP*
6	There are general commands which can help students interact with the different materials of the class.	*NP*
7	There are specific commands to help students establish more meaningful natural exchanges with others during tasks.	*PP*
8	The language presented supports students with the cognitive demands of the unit.	*NP*
	Language *through* learning	
9	There are freer activities which allow students to get to know more about the topic.	*P*
10	There is a coherent progress in the level of challenge of activities which aims at consolidating the use of language skills.	*PP*
11	There are activities which cater for the development of learning to learn skills, communication wise.	*P*
12	There are moments for self- and peer correction on one's performance of communication that allow for reflection on use of language.	*NP*
	BICS & CALP	
13	There is language for social communication.	*PP*
14	There is language for academic purposes.	*PP*
	CLIL material design	
15	There are activities for language development skills (reading, listening, writing and speaking).	*P*
16	There are activities to raise students' awareness of grammar, vocabulary and pronunciation.	*PP*
17	There is an adequate balance between input and output.	*P*
18	There are activities to present, practice and help consolidate vocabulary.	*P*
19	There are illustrations that help convey the meaning of language in the unit.	*PP*

Summary of results

	Level of Presence			Results	
Category	**Present**	**Partially Present**	**Not Present**	**Per category**	**General**
Language of learning	*1*	*1*	*2*	*Not appropriate*	***Not appropriate***
Language for learning	-	*1*	*3*	*Not appropriate*	
Language through learning	*2*	*1*	*1*	*Modifiable*	
BICS & CALP	-	*2*	-	*Not appropriate*	
CLIL material design	*3*	*2*	-	*Modifiable*	

Observations

Language of learning

There seems to be plenty of lexical items which students can use to talk about ecosystems at length (item 1). However, the useful phrases

provided for students to be able to express their own ideas in the topic are limited (item 2). This means that the teacher would have to compensate for the lack of expressions/language to complete some of the activities. For example, on Students' book (SB) pages (p.) 19, 20 and 22, students are encouraged to "compare and contrast" different elements relating to the topic of ecosystems; however, no language is given to complete these tasks.

Throughout the unit, there does not seem to be any explicit reference to the meaning and/or appropriate use of grammatical structures which could help students progressively improve their use of the language, so that they can work with each other through the content in more productive tasks later on in the unit (item 3 and 4).

Language for learning
Even though it is suggested that students have different types of exchanges throughout the unit, there seems to be no reference to language that can help them do these interactions (item 5). For example, on SB p. 30 there is a reference to a game called *call and answer;* yet, no specific reference to the language needed to play the game is given. Same situation can be observed with useful language which can help students better interact with the material; this is absent (item 6).

On the other hand, some language to help during specific tasks students can be found (item 7); nonetheless, only utterances that refer to answers can be seen, this means that the teacher would have to compensate for the lack of questions. Regarding the language that supports the cognitive demands, there seems to be no explicit reference to this in the SB or the TB (item 8), leaving these activities with no language support.

Language through learning
There are several opportunities throughout the unit in which students are encouraged to more independently look for extra information (item 9) and develop their learning to learn skills (item 11). Likewise, the unit progressively works on a small side project in which students are asked to gradually add content and language to reinforce, more independently, the topic that is being worked on (item 10). However, the test at the end of the unit does not seem to reflect a higher level of language demand but the opposite. Finally, there are not moments for self- or peer correction or language that could help in doing so (item 12).

BICS and CALP
The productive tasks seem to be related to a more academic use of the language (item 14), though the amount of support given seems to be rather little. A similar situation can be observed in those tasks which aim at a more social interaction (item 13), though these are present, the language to support them does not seem to suffice the purpose.

CLIL material design
There are plenty of opportunities for reading, listening, writing and speaking (item 15) and there seems to be a balance between input and output (item 17).

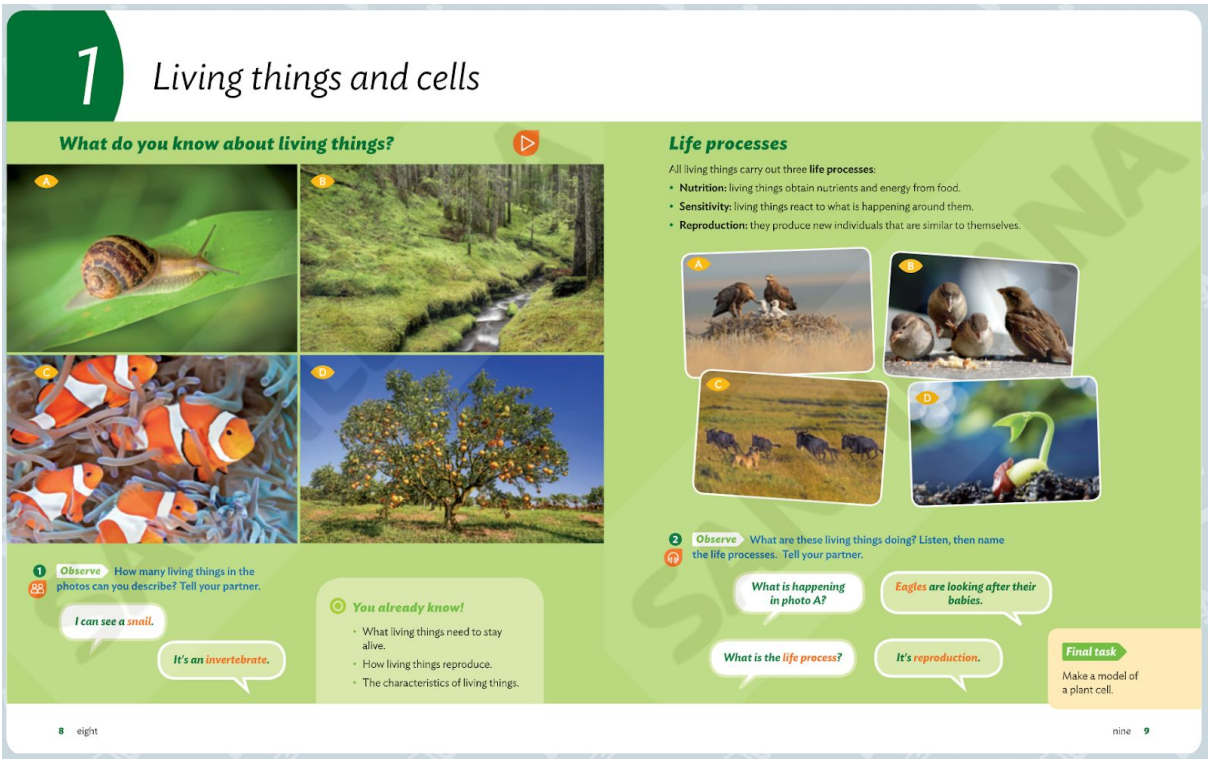
Even though there are activities that focus on the introduction, practice and consolidation of the vocabulary (item 18), a different situation can be seen with grammar and pronunciation (item 16), as these two are completely disregarded. A final consideration would be that the images provided are coherent and help convey meaning of the language, however this is especially done at word level, not paying the same attention to the language needed for interactive communication and individual productions (item 19).

Interpretation of results and minimum requirements for each category

	Appropriate		Modifiable		Not Appropriate	
	P	PP/NP	P	PP/NP	P	PP/NP
Language of learning	*3*	*1*	*2*	*2*	*1*	*3*
Language for learning	*3*	*1*	*2*	*2*	*1*	*3*
Language through learning	*3*	*1*	*2*	*2*	*1*	*3*
BICS & CALP	*2*	-	*2*	-	*1*	*1*
CLIL material design	*4*	*1*	*3*	*2*	*2*	*3*

Appendix 4. Sample units of commercially available books.

4.1 Santillana-Richmond, (2019) Natural Science Learning Lab 5 Aragón Students' Book, unit 1, Living Things and Cells



1 Living things and cells

What do you know about living things?

1 Observe How many living things in the photos can you describe? Tell your partner.

I can see a snail.

It's an invertebrate.

You already know!

- What living things need to stay alive.
- How living things reproduce.
- The characteristics of living things.

Life processes

All living things carry out three life processes:

- Nutrition: living things obtain nutrients and energy from food.
- Sensitivity: living things react to what is happening around them.
- Reproduction: they produce new individuals that are similar to themselves.

2 Observe What are these living things doing? Listen, then name the life processes. Tell your partner.

What is happening in photo A?

Eagles are looking after their babies.

What is the life process?

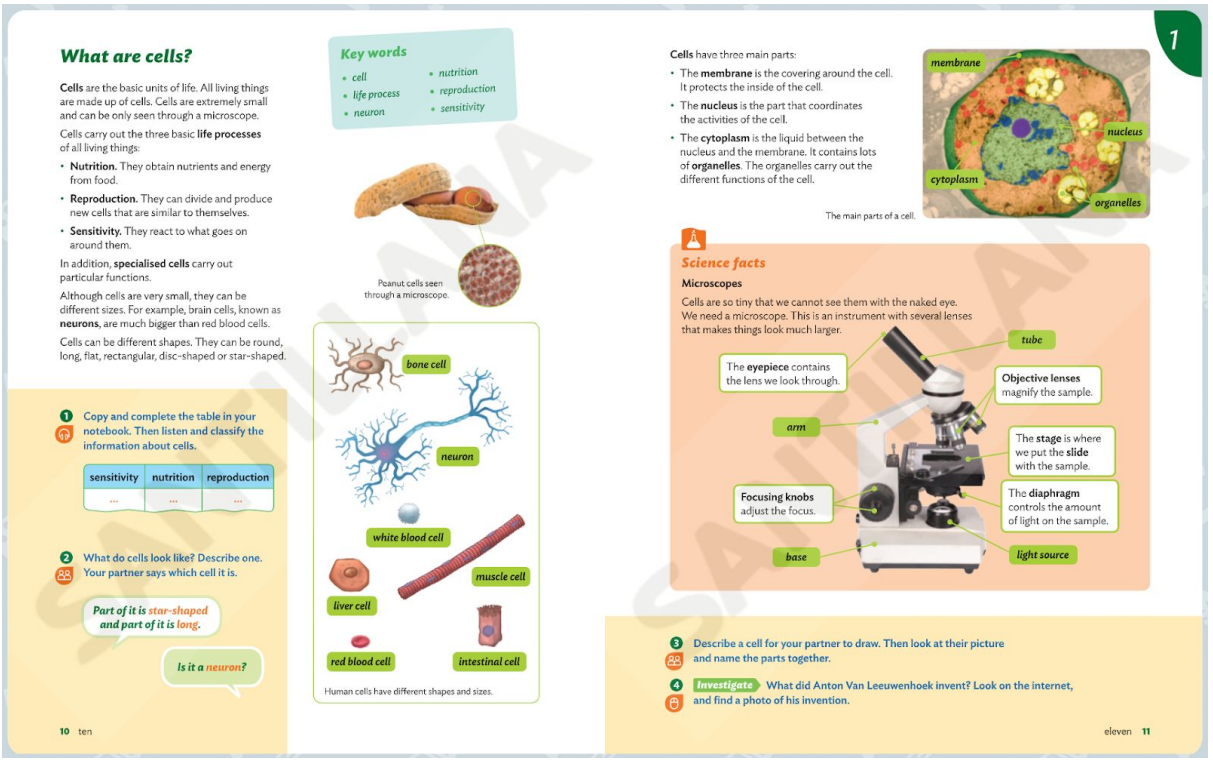
It's reproduction.

Final task

Make a model of a plant cell.

8 eight

nine 9



What are cells?

Cells are the basic units of life. All living things are made up of cells. Cells are extremely small and can be only seen through a microscope.

Cells carry out the three basic life processes of all living things:

- Nutrition. They obtain nutrients and energy from food.
- Reproduction. They can divide and produce new cells that are similar to themselves.
- Sensitivity. They react to what goes on around them.

In addition, specialised cells carry out particular functions.

Although cells are very small, they can be different sizes. For example, brain cells, known as neurons, are much bigger than red blood cells.

Cells can be different shapes. They can be round, long, flat, rectangular, disc-shaped or star-shaped.

1 Copy and complete the table in your notebook. Then listen and classify the information about cells.

sensitivity	nutrition	reproduction
...	...	...

2 What do cells look like? Describe one. Your partner says which cell it is.

Part of it is star-shaped and part of it is long.

Is it a neuron?

Key words

- cell
- life process
- neuron
- nutrition
- reproduction
- sensitivity

Peanut cells seen through a microscope.

bone cell

neuron

white blood cell

muscle cell

liver cell

red blood cell

intestinal cell

Human cells have different shapes and sizes.

1

Cells have three main parts:

- The membrane is the covering around the cell. It protects the inside of the cell.
- The nucleus is the part that coordinates the activities of the cell.
- The cytoplasm is the liquid between the nucleus and the membrane. It contains lots of organelles. The organelles carry out the different functions of the cell.

membrane

nucleus

cytoplasm

organelles

The main parts of a cell.

Science facts

Microscopes

Cells are so tiny that we cannot see them with the naked eye. We need a microscope. This is an instrument with several lenses that makes things look much larger.

tube

The eyepiece contains the lens we look through.

Objective lenses magnify the sample.

arm

The stage is where we put the slide with the sample.

Focusing knobs adjust the focus.

The diaphragm controls the amount of light on the sample.

base

light source

3 Describe a cell for your partner to draw. Then look at their picture and name the parts together.

4 Investigate What did Anton Van Leeuwenhoek invent? Look on the internet, and find a photo of his invention.

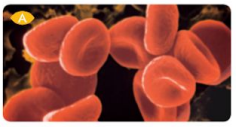
10 ten

eleven 11

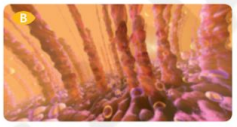
What are animal cells like?

1 **Think about it** Look at the photos of animal cells. Are the statements true or false?

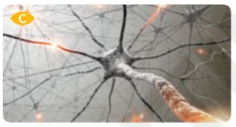
a. Animal cells are all the same shape and size.
b. All the cells in an animal have the same function.
c. Animal cells have a rigid membrane.



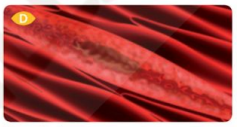
Red blood cells carry oxygen.



Lung cells allow animals to breathe.



Brain cells transmit information.

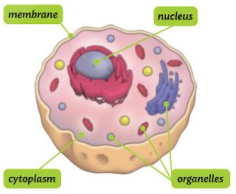


Muscle cells allow movement.

Animals have millions of cells in their body. They are specialised according to their function and type. Animal cells do not produce their own food.

Animal cells can be many different shapes. Their shape is often irregular.

- There is a very **flexible membrane** surrounding the cell. It protects the cell by controlling what goes in and out.
- The **nucleus** coordinates the activities of the cell.
- The **cytoplasm** fills most of an animal cell. It gives the cell its shape and keeps the **organelles** in their correct place.

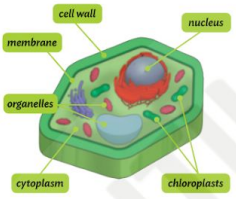


The parts of an animal cell.

What are plant cells like?

Plant cells have a membrane, a nucleus and cytoplasm with organelles. They are usually bigger than animal cells and have a regular shape.

- Plant cells have specialised organelles called **chloroplasts** that contain a green substance called **chlorophyll**. Chlorophyll absorbs sunlight, which plants need to make their own food. It gives plant cells their green colour.
- Plant cells have a **rigid cell wall** around the membrane. That is why the stems and branches of some plants are very hard.



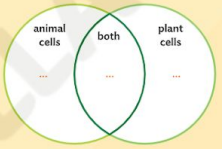
The parts of a plant cell.


Bamboo stems are very hard.

1 Answer the questions in your notebook.

a. What shape are animal cells?
b. What shape are plant cells?
c. Why is wood hard?
d. Why are leaves green?
e. Why do plants need sunlight?

2 **Compare** Copy the Venn diagram. Write similarities and differences between animal cells and plant cells. Tell your partner.



How are animal cells and plant cells similar?

They both have membranes.

3 **Think about it** Why don't onion cells have chloroplasts? Think about where they grow to help you decide. Then listen and check your answers.

Unicellular and multicellular living things

Unicellular living things are made up of **one single cell**. These living things are found everywhere. They are in water, in soil, in the air and in our body. They are all very tiny, and we need a microscope to see them.

There are different types of unicellular organisms:

- **Bacteria** are the smallest living organisms. They have a tail that spins to make the cell move.
- **Protozoa** are organisms, like **amoeba**, that live in water or in wet places. An amoeba is only a single cell, but it can change its shape.
- **Yeasts** are often used to make bread or beer. They reproduce rapidly.

Key words

- amoeba
- bacteria
- bud
- multicellular
- protozoa
- unicellular
- yeast

Multicellular living things are made up of a **very large number of cells**. All the living things that we can see around us, like animals and plants, are multicellular. They are visible to the naked eye.


A jellyfish is a multicelullar living thing.

1 Make sentences about unicellular organisms in your notebook.

Bacteria	are	...
Protozoa	have	...
Yeast	live	...

2 How many multicellular living things can you write down in one minute? Compare your list with your partner.

Mini Lab

Investigate onion cells

An onion is a multicellular living thing. It is made of different layers. Each layer is separated by a thin skin called a membrane.

You need

- a small piece of onion
- a glass slide
- a microscope
- silicon gloves
- iodine dye
- tweezers
- a glass cover slip
- a saucer

Do your experiment

1 Put on the gloves. Take a small piece of onion. Use the tweezers to peel off the transparent membrane between the layers.
2 Put the membrane on a saucer. Add a drop of iodine dye. Be careful not to drop iodine on your skin and clothes.
3 Clean the tweezers.
4 Use the tweezers again to put the membrane on a slide. Lower a thin glass cover slip over the slide. Make sure there are no air bubbles.
5 Put the slide on the stage of the microscope.
6 Look through the eyepiece lens. Turn the focusing knobs until you can see the cells clearly. Identify the following: the cell wall, the cell nucleus and the cell membrane.

Write your conclusions

- Onion cells are ... .
- Onion cells have ... .

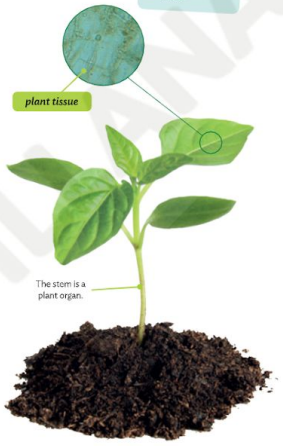
1

How are living things organised?

Multicellular living things are made up of many different types of **cells**. These cells work together at different levels, called **levels of organisation**.

- Groups of the same type of cells join together to form **tissues**. For example, animals have muscle tissue, which consists of muscle cells grouped together. Their bone cells join together to form the bone tissue of the skeleton.
  Plants also have tissues. For example, the epidermis is the tissue that covers the leaves.
- Tissues join together to form **organs**. Tissues in organs work together to carry out a common function.
  Muscles, bones, the heart and the lungs are examples of animal organs. Leaves, flowers, roots and stems are examples of plant organs.

Key words
- *cell*
- *level of organisation*
- *organ*
- *tissue*



Lifestyle

The immune system

All our cells, tissues and organs work together to protect us. This defence system is called our immune system. For example, our defences create barriers against harmful bacteria. Our defence system helps us to prevent colds or more serious illnesses.

We can make our immune system stronger by eating healthy food and taking regular exercise.

1 Is a leaf a plant organ? What other organs does a plant have?

- Organs form **systems**. The organs in systems work together to carry out a common function. For example, the **muscular system** enables the body to move. The **digestive system** enables the body to obtain nutrients.
- Finally, all the different systems work together to form an **organism**, a complete living thing.

In a multicellular living thing, cells, tissues, organs and systems all work together to make the organism function correctly.

In a unicellular living thing, such as bacteria, there is only the first level of organisation, the cell. This one cell carries out all the functions of the living thing.

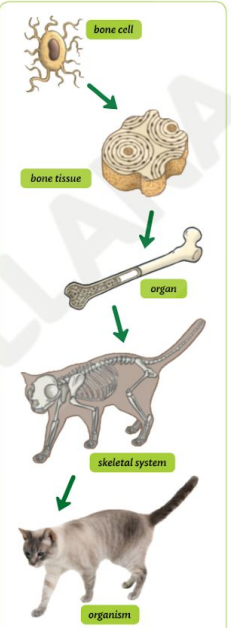
2 *Think about it* Do you agree that 'cells are like the building bricks of living things'?

3 Look at the diagram and describe the levels of organisation to your partner.

This is a bone cell. Cells are the first level of organisation.

4 Copy and complete the text. Then listen and check your answers.

Groups of ... join together to form tissues. Animals and plants both have tissues. In plants, the ... that covers the leaves is called the epidermis. Tissues join together to form ..., for example, muscles and bones in animals, or stems in plants. Organs join together to form ... In animals, the ... enables the body to obtain nutrients. Finally, all the systems form an ..., a complete living thing.



The levels of organisation of a cat.

1

Check your progress

Vocabulary

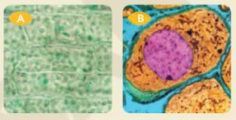
1 Listen and say *membrane, nucleus, cytoplasm, organelles, unicellular or multicellular.*

2 Make sentences about the parts of a cell in your notebook.

The membrane	is the liquid between the nucleus and the membrane.
The nucleus	carry out different functions and are located in the cytoplasm.
The cytoplasm	coordinates the activities of the cell.
The organelles	is the covering around the cell.

Concepts

3 Look at the photos and answer the questions.



a. What can you see?
b. Does each cell belong to a plant or an animal?
c. In your notebook, draw a single cell from each photograph. Label the parts you can identify.

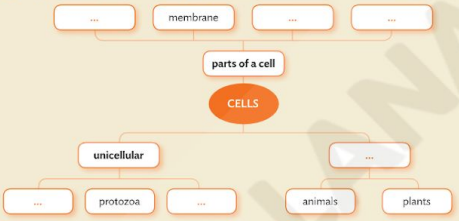
4 Find the mistakes in each sentence. Then listen and check your answers.

a. Some living things are made up of cells.
b. Cells are living units because they carry out the two basic life processes: nutrition and reproduction.
c. Animal cells have a rigid membrane that surrounds the cell and holds it together.
d. Plant cells have organelles called chloroplasts that contain an orange substance called chlorophyll.
e. Groups of organs are organised to form tissues.

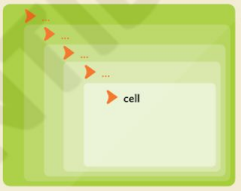
5 Write the levels of organisation of the dog in your notebook.

Apply what you know

6 Copy and complete the mind map in your notebook.

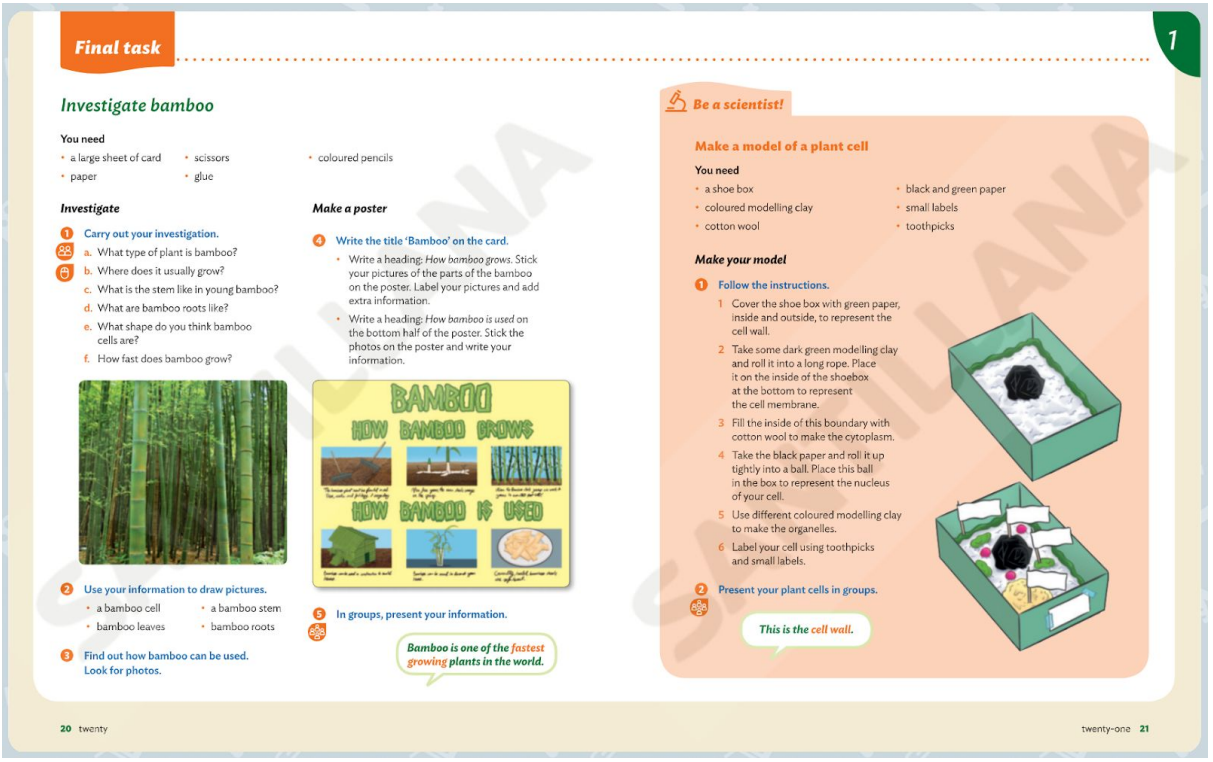


7 What are the levels of organisation of living things? Copy and complete the diagram.



My progress Think about your work in this unit. Copy and complete.

	YES	NO	NOT SURE
I can describe the parts of a cell.	...	...	...
I can identify different types of cells.	...	...	...
I can name the levels of organisation of living things.	...	...	...



Final task

1

Investigate bamboo

You need
- a large sheet of card
- paper
- scissors
- glue
- coloured pencils

Investigate

1 Carry out your investigation.
a. What type of plant is bamboo?
b. Where does it usually grow?
c. What is the stem like in young bamboo?
d. What are bamboo roots like?
e. What shape do you think bamboo cells are?
f. How fast does bamboo grow?

2 Use your information to draw pictures.
- a bamboo cell
- a bamboo stem
- bamboo leaves
- bamboo roots

3 Find out how bamboo can be used. Look for photos.

Make a poster

4 Write the title 'Bamboo' on the card.
- Write a heading: *How bamboo grows*. Stick your pictures of the parts of the bamboo on the poster. Label your pictures and add extra information.
- Write a heading: *How bamboo is used* on the bottom half of the poster. Stick the photos on the poster and write your information.

5 In groups, present your information.

Bamboo is one of the fastest growing plants in the world.

Be a scientist!

Make a model of a plant cell

You need
- a shoe box
- coloured modelling clay
- cotton wool
- black and green paper
- small labels
- toothpicks

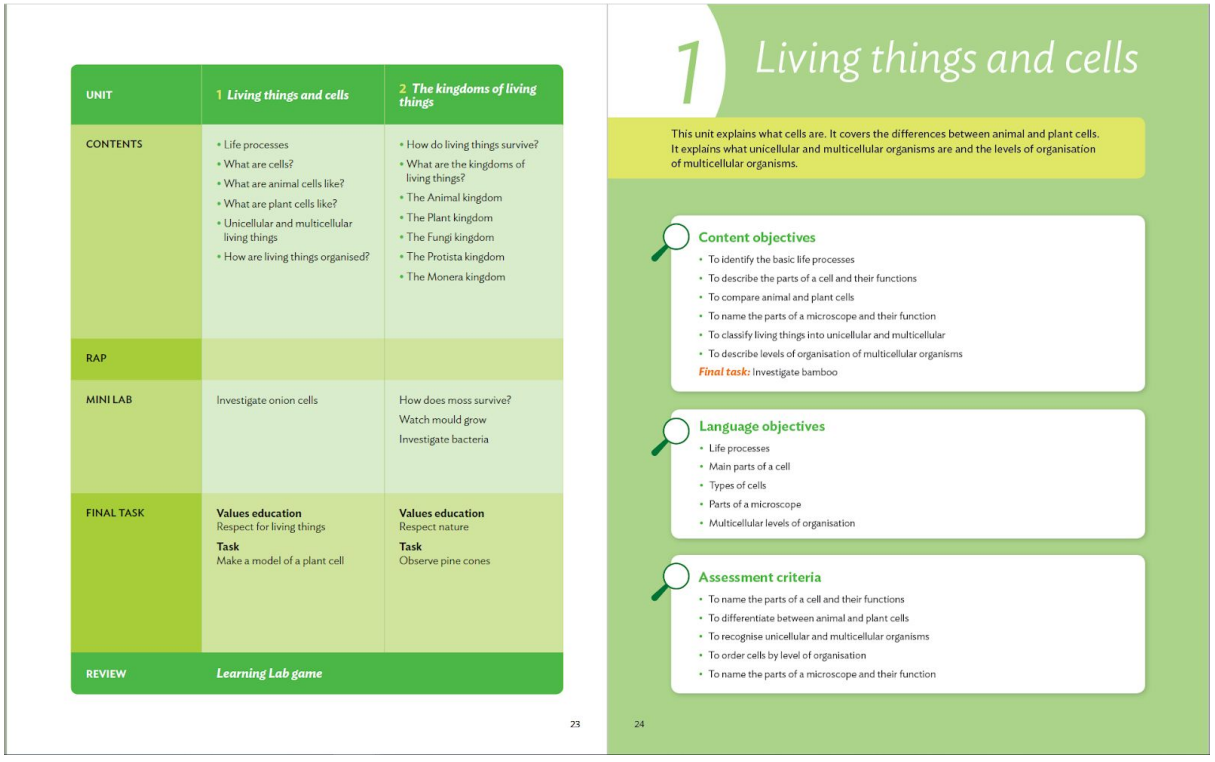
Make your model

1 Follow the instructions.
1 Cover the shoe box with green paper, inside and outside, to represent the cell wall.
2 Take some dark green modelling clay and roll it into a long rope. Place it on the inside of the shoebox at the bottom to represent the cell membrane.
3 Fill the inside of this boundary with cotton wool to make the cytoplasm.
4 Take the black paper and roll it up tightly into a ball. Place this ball in the box to represent the nucleus of your cell.
5 Use different coloured modelling clay to make the organelles.
6 Label your cell using toothpicks and small labels.

2 Present your plant cells in groups.

This is the cell wall.

4.2 Santillana-Richmond, (2019) Natural Science Learning Lab 5 Aragón Teacher's Book, unit 1, Living Things and Cells



UNIT	1 *Living things and cells*	2 *The kingdoms of living things*
CONTENTS	• Life processes • What are cells? • What are animal cells like? • What are plant cells like? • Unicellular and multicellular living things • How are living things organised?	• How do living things survive? • What are the kingdoms of living things? • The Animal kingdom • The Plant kingdom • The Fungi kingdom • The Protista kingdom • The Monera kingdom
RAP		
MINI LAB	Investigate onion cells	How does moss survive? Watch mould grow Investigate bacteria
FINAL TASK	**Values education** Respect for living things **Task** Make a model of a plant cell	**Values education** Respect nature **Task** Observe pine cones
REVIEW	*Learning Lab game*	

23

1 Living things and cells

This unit explains what cells are. It covers the differences between animal and plant cells. It explains what unicellular and multicellular organisms are and the levels of organisation of multicellular organisms.

Content objectives
- To identify the basic life processes
- To describe the parts of a cell and their functions
- To compare animal and plant cells
- To name the parts of a microscope and their function
- To classify living things into unicellular and multicellular
- To describe levels of organisation of multicellular organisms

Final task: Investigate bamboo

Language objectives
- Life processes
- Main parts of a cell
- Types of cells
- Parts of a microscope
- Multicellular levels of organisation

Assessment criteria
- To name the parts of a cell and their functions
- To differentiate between animal and plant cells
- To recognise unicellular and multicellular organisms
- To order cells by level of organisation
- To name the parts of a microscope and their function

24

Unit 1 outline

- Living things and cells
- What are cells?
- What are animal cells like?
- What are plant cells like?
- Unicellular and multicellular living things
- How are living things organised?
- Final task: Make a model of a plant cell

Unit 1 resources

Digital resources
- LibroMedia / i-book: unit 1
- Audio: unit 1

Classroom materials
- Visual thinking posters

Photocopiable materials
- Reinforcement worksheet unit 1
- Extension worksheet unit 1
- Graphic organiser: unit 1
- Language support: unit 1
- Diagnostic test
- Assessment worksheets 1A and 1B

Other materials
- Activity Book: unit 1
- CLIL Readers

Timing

October	November	December
☐☐☐☐	☐☐☐☐	☐☐☐☐

25

Learning goals
- To activate previous knowledge about living things
- To name some living things

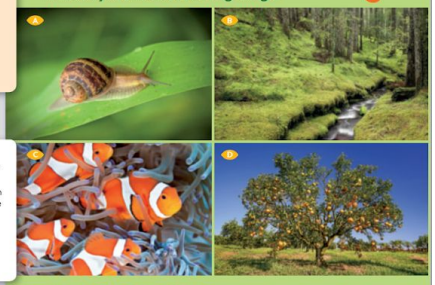
Key language

Vocabulary
fish, invertebrate, river, snail, tree, vertebrate

Language structures
I can see a snail.
Snails are invertebrates.
Snails and fish are oviparous.

1 Living things and cells

What do you know about living things?



Observe
1 **How many living things in the photos can you describe?**
Read the speech bubbles. Then in pairs, students talk about the different characteristics of the living things in the photos.
There are plants and animals.
They are all living things.
Check answers as a class.

1 Observe How many living things in the photos can you describe? Tell your partner.

I can see a snail.

It's an invertebrate.

You already know!
Ask for a volunteer to read the text. Students name characteristics of living things.

You already know!
- What living things need to stay alive.
- How living things reproduce.
- The characteristics of living things.

8 eight

Reinforcement
Students draw a table with the headings living things and non-living things. In small groups, students complete the table with the differences between living and non-living things.

26

Life processes

All living things carry out three **life processes**:
- **Nutrition:** living things obtain nutrients and energy from food.
- **Sensitivity:** living things react to what is happening around them.
- **Reproduction:** they produce new individuals that are similar to themselves.

2 Observe What are these living things doing? Listen, then name the life processes. Tell your partner.

What is happening in photo A?

Eagles are looking after their babies.

What is the life process?

It's reproduction.

Final task
Make a model of a plant cell.

nine 9

LibroMedia / i-book
Video
Play the video, first with subtitles on, then without them.
Ask questions and discuss with the class.

Learning goals
- To review the three life processes of living things.

Key language

Vocabulary
life process, nutrition, reproduction, sensitivity

Language structures
What is the life process? It's reproduction.

Final task
The task encourages students to collect information in order to undertake an investigation, and present their findings.

Life processes
Explain: *All living things carry out three life processes.*
Ask: *What are the three life processes?*
Read the definition of nutrition and give an example: *When I eat breakfast I am carrying out the life process of nutrition.*
Repeat with the other life processes.

Observe
2 **What are these living things doing? Listen, then name the life processes.**
Read the speech bubbles. Play the audio. Students tell their partners the life process. Play the audio again, stopping after each picture. Ask a group of students to answer out loud.
Full transcript, page 56, Track 1.

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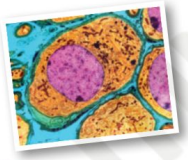
KEY VOCABULARY

1 Living things and cells

bacteria the smallest unicellular organisms.
cell the basic unit of all living things.
cell wall the rigid covering around the membrane of a plant cell.
chlorophyll the green substance in plants that absorbs sunlight and gives plant cells their green colour.
chloroplast one of the specialised organelles in plant cells containing chlorophyll.
cytoplasm the liquid part between the nucleus and membrane of a cell.
membrane the protective covering around a cell.



microscope an instrument with several lenses that makes things look much larger.
multicellular living thing a living thing, like a plant or an animal, made up of a very large number of cells.
neuron a specialised brain cell that transmits information.
nucleus the part of a cell that coordinates its activities.
nutrition the life process by which living things obtain nutrients and energy from food.
organ a group of tissues that join together to carry out a common function.

organelle one of the tiny components of a cell that carry out its different functions.
organism a complete living thing formed of cells, tissues, organs and systems all working together.
protozoa unicellular organisms, like amoeba, living in water or wet places.
reproduction the life process by which living things produce new individuals that are similar to themselves.
sensitivity the life process by which living things react to what is happening around them.
system a group of organs that work together to carry out a common function.
tissue a group of cells that work together.
unicellular living thing a tiny living thing made up of one single cell that can we can only see through a microscope.
yeast a unicellular organism that reproduces rapidly, and is used to make bread.

112 one hundred and twelve

4.3 Cambridge University Press, (2019). Natural Science Students' Book, unit 2, Ecosystems

WHAT IS A SAVANNAH?

Discover... the different types of grassland.

Grasslands are large areas of grass, found in places with very little rain. Trees need a lot of rain to grow which means that grass and small plants tend to grow instead.

Savannahs are found in tropical areas where there is more rain. For this reason, you may see some trees, but not many! Elephants, giraffes and zebras live here.

Temperate grasslands are found in cool climates, normally where it is dry and windy. The grass is often shorter. Bison, deer, wolves and rabbits live here.

Do you know what the word *temperate* means? Find out!

A male lynx needs to eat one rabbit per day to survive. If you had to eat only one thing a day, what would it be?

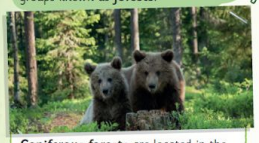
The Iberian lynx lives in the grasslands of Spain. The thick grass provides shelter and the open land makes it easy to hunt rabbits.

Listen to Hannah. What type of ecosystem did she visit? What animals did she see?

WHERE DO BROWN BEARS LIVE?

Discover... the different types of forest.

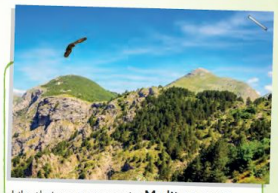
Rainy places allow trees to grow in large groups known as **forests**.



Coniferous forests are located in the colder zones of the northern hemisphere. Brown bears, reindeer, moose, wolves and weasels live among evergreen trees.

Deciduous forests are dominated by trees whose leaves change colour and fall off each autumn. You can find deer, squirrels, beavers, foxes and wild boar here.

We can find over half the plant and animal species on Earth in **tropical rainforests**. Located near the equator, the temperature is high, but there is lots of rain.



Like their name suggests, **Mediterranean forests** are found near the Mediterranean Sea. Typical flora includes oak trees, rosemary and thyme.

Explore STAGE 2

- Find out about the climate and location of your chosen ecosystem.
- Make a spider diagram showing the information you have found out so far.

HOW DO CAMELS SURVIVE IN THE DESERT?

Discover... how organisms have adapted to high temperatures and little water.

Deserts are the hottest and driest places on Earth. During the day, temperatures can reach up to 50 °C, but can drop to 0 °C at night. Living things have adapted to the changes in temperature and the lack of water.

What is the largest desert in the world? Where is it found?

When it is scorching hot outside, what better way to beat the heat than to sleep all day? Many desert animals are **nocturnal**. They are only active at night when it is cooler.

Find examples of nocturnal animals.

A cactus can **store water** for long periods of time. They have got a thick waxy layer and **spines** instead of leaves, which reduces water loss. The spines also protect the cactus from animals that might want to eat it!

Camels **store nutrients** in their humps and lose hardly any water through sweating or urination. This means they can go for a long time without having a drink or a snack!

Explore STAGE 3

- Research the flora and fauna of your ecosystem. What are the adaptations needed to live in this ecosystem? Think about food, water, predators, prey and climate.
- Add the information to your diagram from Stage 2.
- Tell a partner what you discovered.

I found out that ...

I discovered that ...

WHY DO POLAR BEARS NEED TO BE FAT?

Find out more...

Discover... how some animals can survive in very cold temperatures.

Background: Some animals that live in very cold temperatures have got a thick layer of fat, called blubber.

Hypothesis: If you had more fat on your body, would you notice the cold as much? Why? / Why not?

Materials: large bowl, water, ice cubes, butter

Step 1: Get a bowl large enough to fit both hands in. Fill it with water and ice cubes. Leave it for five minutes.

Step 2: Put both hands in the bowl and count to ten. Take your hands out and warm them for a few minutes. This is the **control**.

Step 3: Now, rub butter over one hand. Put both hands back in the water and count to ten.

Step 4: Wash your hands with warm water and soap.

Reflect 1 How does each hand feel in the water? Do both hands feel the same?

Reflect 2 How does each hand feel this time? Do both hands feel the same?

In conclusion, ...

Animals in colder climates need ...

Conclusion: What did you find out? Do you think extra fat on your body would keep you warmer? Why?

WHAT LIVES IN A POND?

Discover...
the difference between a marine and a freshwater ecosystem.

Aquatic ecosystems can be ...

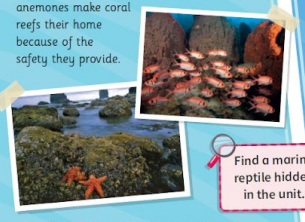
MARINE

Water type: salt water
Examples: oceans and seas
Flora: giant kelp, seagrass, sea grapes and plankton
Fauna: sharks, turtles, dolphins, crabs, jellyfish and sponges
Fact: It is the largest ecosystem on Earth!

FRESHWATER

Water type: fresh water
Examples: lakes, rivers, streams and ponds
Flora: bulrushes, reeds and waterlilies
Fauna: fish, crocodiles, turtles and frogs
Fact: Water is constantly recycled.

Coral reefs are one of the most diverse ecosystems on Earth. They are home to about 25% of all marine life. Many animals, such as clownfish, sponges and sea anemones make coral reefs their home because of the safety they provide.



Find a marine reptile hidden in the unit.

Despite their small size, **ponds** are home to a variety of aquatic life, like snails, frogs, fish and large birds, such as herons.

The **shoreline** is where the sea meets the land. Organisms that live here, such as starfish, molluscs and sea urchins, have adapted to strong tides and waves. Most can stick to the surface of rocks.

Look back
Protists dominate aquatic ecosystems. Are protists unicellular or multicellular?

WHICH BIRD OF PREY LIVES IN NEW YORK CITY?

Discover...
the natural and artificial elements of an urban ecosystem.

Instead of adapting to ecosystems, humans have adapted ecosystems to suit them. These are known as **urban ecosystems**. They have got many **artificial elements**, but also contain **natural elements**.

Artificial elements include buildings, airports, parks and bridges.

What are the natural elements of an urban ecosystem? Discuss.

The natural elements include ...

Animals can survive here because ...

New York City has got a higher **peregrine falcon** population than most places on Earth. All the skyscrapers make a great habitat for these birds of prey. They provide an ideal look-out point, in the same way cliffs do, for prey such as pigeons and blackbirds.

Explore STAGE 4

- Now that you have studied the different types of ecosystem, you can add this information to your diagram. What characteristics define your chosen ecosystem?
- Does your ecosystem contain any artificial elements? Find out and make a list of the consequences of human interference.

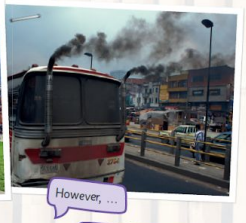
Language Review

1 Complete the sentences in your notebook with the correct form of the adjective or adverb.

a The spines on a cactus make it ..... (good) at reducing water loss than a plant with broad leaves.
b Tropical rainforests are home to a ..... (diverse) range of species than anywhere else in the world.
c Temperatures in temperate grasslands are ..... (extreme) than in deserts.
d The Iberian lynx can hunt ..... (effective) in a habitat with thick grass and open land than in a city.
e Thanks to their blubber, polar bears and seals can tolerate cold temperatures ..... (easy) than most other animals.

2 Look at the photos. Talk with a partner about urban ecosystems. Mention the things in the box.

natural elements artificial elements habitats
habitat destruction pollution air quality



Also, ...
What's more, ...
However, ...
On the other hand, ...

3 Do you prefer urban or rural environments? Discuss with a partner.

Content Review

1 Unscramble the letters to make words. Use some of the words to complete the sentences.

Assessment link
For more Unit 2 activities go to page 80.

eceosstmy svaahnsna dpaat oulpoatipn htbaiat sderte

a ..... are a type of grassland found in tropical areas.
b A ..... is the home of a living thing.
c An ..... is made up of a community of organisms and the abiotic factors in an area.
d Living things ..... to their natural surroundings.

2 Look at the photos and identify the ecosystems. Write down two characteristics of each ecosystem.

a

b

Explore FINALE

- Prepare and carry out a presentation on your ecosystem. You can find others who have chosen the same ecosystem and work in pairs or small groups.
- Use the information you have collected and include some pictures or videos.
- Think about the structure of your presentation. How many sections will it have? What are you going to say? What is your partner going to say?

4.4 Cambridge University Press, (2019). Natural Science Teacher's Book, unit 2, Ecosystems

2

ECOSYSTEMS

Learning objectives

By the end of this unit, pupils will have achieved a greater understanding of the following concepts:

- the principle characteristics and components of an ecosystem
- how populations, communities and ecosystems are structured
- how organisms adapt to their habitat.

Competences

This unit covers the following competences:

- Linguistic competence
- Mathematical and basic competences in science and technology
- Digital competence
- Learning to learn
- Cultural awareness and expression

Key vocabulary

Abiotic factors: air quality, climate, non-living, rock, soil, sunlight, temperature, water

Ecosystem: abiotic / biotic factor, adapt / adaptation, artificial, community, fauna, flora, habitat, individual, living, natural, physical environment, population

Ecosystem types: aquatic, arctic, coniferous, coral, deciduous, desert, forest, freshwater, grassland, marine, Mediterranean, pond, rainforest, savannah, shoreline, temperate, tropical, tundra, urban

Cambridge English Qualifications practice

You will find ***A2 Key for Schools*** activity types in the following exercises:
Pupil's Book, Page 22 – Listening Part 2
Pupil's Book, Page 28, Activity 2 – Speaking Part 2, Part 1
Pupil's Book, Page 28, Activity 3 – Speaking Part 2, Part 2
Activity Book, Page 13, Activity 11 – Reading and Writing Part 3

Throughout this unit, you will find the following ***A2 Key for Schools*** vocabulary: airport, area, autumn, body, building, camel, desert, city, fat, forest, lake, look-out, park, river, sea, store, suit, variety

Throughout this unit, you will find the following **B1 Preliminary for Schools** vocabulary: Antarctica, lack, natural, northern, ocean, stream, suggest, protect, thick, waves

22

Materials needed for *Find out more*

- butter
- cold water
- ice cubes
- large bowl

Materials needed for other activities

- A4 card
- activated charcoal
- clean, airtight jar with lid
- coloured paper or paint
- creative materials for ecosystem
- moss or slow-growing plants
- photos and pictures of different ecosystems
- photos of organisms from chosen ecosystem
- printed world map, one per pupil
- rocks
- sand or gravel
- shoe box
- soil
- water
- world map

Explore

The *Explore* project encourages the pupils to research and present an ecosystem from a different continent. The different *Explore* stages focus on the following skills:

- autonomous research
- organising information using graphic organisers
- producing oral descriptions
- preparing and giving a presentation.

Digital Lab 5 Natural Science

- Interactive activities
- Flashcards: *Ecosystems*
- Song: *Ecosystems on Earth*
- Video documentary: *Amazing adaptations*

23

UNIT 2
PAGES 18–19

Objective

Pupils will be introduced to different ecosystems and compare and contrast the features of each.

Key vocabulary

adaptation, climate, desert, ecosystem, forest, freshwater, grassland, living, marine, non-living, tundra, urban

Warm up

- Write *ecosystem* on the board in big letters. Create a word cloud to stimulate pupils' previous knowledge.

Main concepts

- What does *ecosystem* mean? Break it into two words: *eco* + *system*. Tell pupils the prefix *eco-* comes from a Greek word meaning house. Can they recall what a *system* is from Unit 1?
- Discuss the photos using the linguistic support features to help.
- Choose two ecosystems from the page. Create a list on the board outlining the similarities and differences between the two. Encourage a discussion of the living and non-living parts of each ecosystem. Pupils then repeat this with two other photos. Focus on the appropriate use of comparatives.

24

2 ECOSYSTEMS

Look and discuss...
Can you name these ecosystems?

Ecosystems are made up of living and non-living things. An ecosystem can be as big as the ocean or as small as a puddle!

I think this ecosystem is a ...

I'm not sure. It looks more like a ...

18

Song
Ecosystems on Earth

How are the ecosystems similar?
How are they different?

DOCUMENTARY
Amazing adaptations

Explore

Explore an ecosystem from a different continent and do a presentation. You will:
- discover the characteristics of an ecosystem.
- learn about different types of ecosystems.
- find out how animals adapt to their surroundings.

19

Pupils should find similarities and differences related to landscape, living things, climate, location and man-made elements.

For next lesson... activated charcoal, airtight jar with lid, moss or slow-growing plants, rocks, sand or gravel, soil, water

Learn more

- Pupils choose an ecosystem and write a short description of what it would be like to visit. Encourage them to think about the weather and what they would need for their trip.

Song
This song focuses on different ecosystems found on Earth. It can be used as a review at the end of the unit (pages 28–29).

Documentary
The documentary explores the evolution of organisms and how they have adapted to their environments. It can be used on page 25. You could include discussion activities alongside the video and encourage further research of adaptations.

25

UNIT 2
PAGES 20–21

Objective

Pupils will learn about the components of an ecosystem and distinguish between biotic and abiotic factors, understanding the concepts: *individual*, *population*, *community* and *habitat*.

Key vocabulary

abiotic / biotic factor, air quality, climate, community, ecosystem, fauna, flora, habitat, individual, living, physical environment, population, rock, soil, sunlight, temperature, water

Warm up

- Scramble the words *sunlight*, *temperature*, *climate* and *water* on the board. Ask pupils to identify the words and discuss what they all have in common. Name more abiotic factors and explain their importance in an ecosystem.

Main concepts

- Show photos and pictures of different ecosystems, one at a time. Pupils have two minutes for each picture to list as many biotic and abiotic factors as they can.
- Pupils can write definitions and illustrations in their notebook for *ecosystem*, *habitat*, *individual*, *population* and *community*.

The community of living things and the physical environment surrounding them (biotic and abiotic factors).

WHAT MAKES UP AN ECOSYSTEM?

Discover... the difference between a population and a community.

sunlight, air quality, temperature, climate, rocks, water, soil

An **ecosystem** is made up of a **community** of **living things** and the **physical environment** that surrounds them. The living things that make up the community can be from any of the five kingdoms.

The **non-living** components of an ecosystem are called the **abiotic factors**.

What are the living components of an ecosystem known as?

Look back! Can you remember the names of the five kingdoms?

Monera, Protist, Fungus, Plant, Animal

Biotic factors

A **habitat** is the home of a living thing. The habitat of the endangered Iberian lynx is the grassland in the south of Spain.

A group of the same **individual** is called a **population**. Different populations that interact with each other are called a **community**.

individual, population, community

Living things in an ecosystem are divided into two main groups: **flora** (plants) and **fauna** (animals).

Explore STAGE 1

- Choose one of the following ecosystems: the Atacama Desert, the Great Barrier Reef, the Amazon Rainforest, New York City or the Serengeti National Park.
- Research the living and non-living components of your chosen ecosystem.

Pupils can research the living and non-living components at home or at school. This could be set out as a table in their notebooks.

20

21

Learn more

- Pupils research how each abiotic factor influences different living things.
- Pupils create an ecosystem in a bottle using a clean, airtight jar with a lid, sand or gravel, activated charcoal, rocks, soil, moss or slow-growing plants and water.
- Alternatively, pupils can choose an organism and draw it in a comic strip, showing its population, community and habitat.
- Pupils look back and identify the ecosystems from Unit 1.
- Alternatively, they can think about and draw their favourite natural space, describing the biotic and abiotic factors.

Tip

You may want to further explore the habitats of different organisms, focusing on the abiotic and biotic factors.

26

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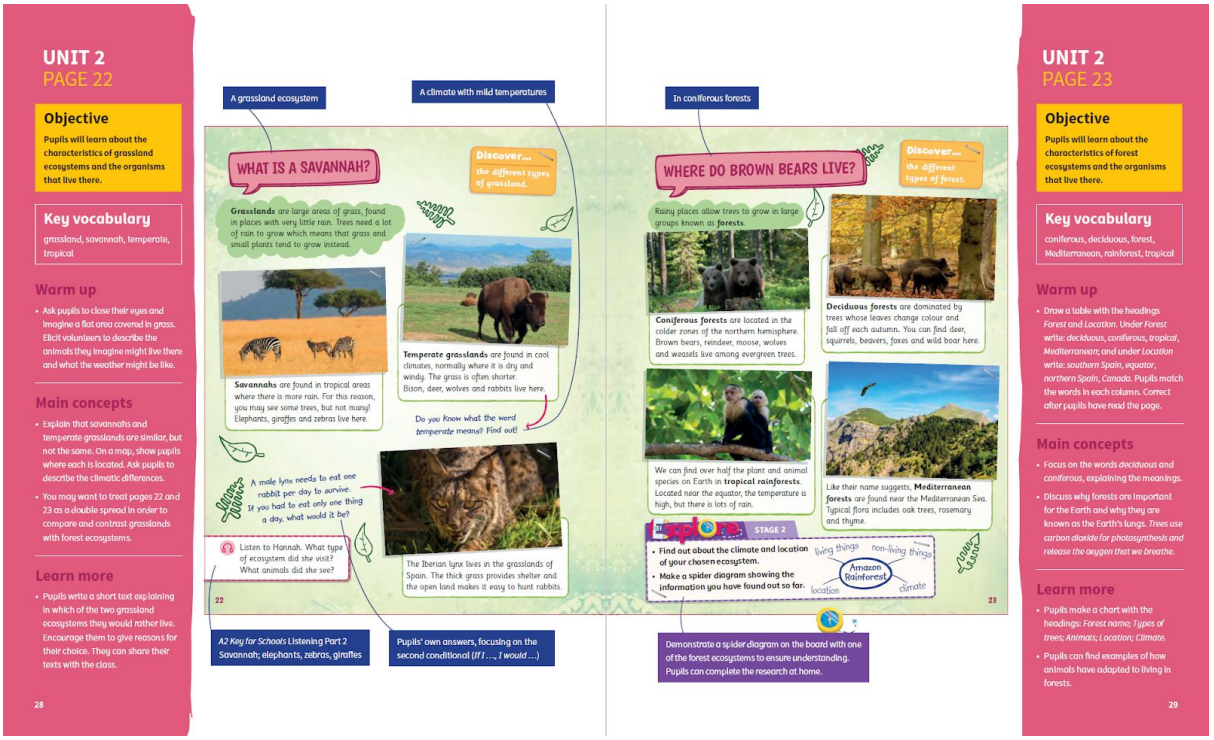

UNIT 2
PAGE 22

Objective

Pupils will learn about the characteristics of grassland ecosystems and the organisms that live there.

Key vocabulary

grassland, savannah, temperate, tropical

Warm up

- Ask pupils to close their eyes and imagine a flat area covered in grass. Elicit volunteers to describe the animals they imagine might live there and what the weather might be like.

Main concepts

- Explain that savannahs and temperate grasslands are similar, but not the same. On a map, show pupils where each is located. Ask pupils to describe the climatic differences.
- You may want to treat pages 22 and 23 as a double spread in order to compare and contrast grasslands with forest ecosystems.

Learn more

- Pupils write a short text explaining in which of the two grassland ecosystems they would rather live. Encourage them to give reasons for their choice. They can share their texts with the class.

A grassland ecosystem

A climate with mild temperatures

WHAT IS A SAVANNAH?

Discover... the different types of grassland.

Grasslands are large areas of grass, found in places with very little rain. Trees need a lot of rain to grow which means that grass and small plants tend to grow instead.

Savannahs are found in tropical areas where there is more rain. For this reason, you may see some trees, but not many! Elephants, giraffes and zebras live here.

Temperate grasslands are found in cool climates, normally where it is dry and windy. The grass is often shorter. Bison, deer, wolves and rabbits live here.

Do you know what the word *temperate* means? Find out!

A male lynx needs to eat one rabbit per day to survive. If you had to eat only one thing a day, what would it be?

Listen to Hannah. What type of ecosystem did she visit? What animals did she see?

The Iberian lynx lives in the grasslands of Spain. The thick grass provides shelter and the open land makes it easy to hunt rabbits.

A2 Key for Schools Listening Part 2
Savannah; elephants, zebras, giraffes

Pupils' own answers, focusing on the second conditional (*If I …, I would …*)

In coniferous forests

WHERE DO BROWN BEARS LIVE?

Discover... the different types of forest.

Rainy places allow trees to grow in large groups known as **forests**.

Coniferous forests are located in the colder zones of the northern hemisphere. Brown bears, reindeer, moose, wolves and weasels live among evergreen trees.

Deciduous forests are dominated by trees whose leaves change colour and fall off each autumn. You can find deer, squirrels, beavers, foxes and wild boar here.

We can find over half the plant and animal species on Earth in **tropical rainforests**. Located near the equator, the temperature is high, but there is lots of rain.

Like their name suggests, **Mediterranean forests** are found near the Mediterranean Sea. Typical flora includes oak trees, rosemary and thyme.

Explore STAGE 2

- Find out about the climate and location of your chosen ecosystem.
- Make a spider diagram showing the information you have found out so far.

living things, non-living things, Amazon Rainforest, location, climate

Demonstrate a spider diagram on the board with one of the forest ecosystems to ensure understanding. Pupils can complete the research at home.

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UNIT 2
PAGE 23

Objective

Pupils will learn about the characteristics of forest ecosystems and the organisms that live there.

Key vocabulary

coniferous, deciduous, forest, Mediterranean, rainforest, tropical

Warm up

- Draw a table with the headings *Forest* and *Location*. Under *Forest* write: *deciduous*, *coniferous*, *tropical*, *Mediterranean*; and under *Location* write: *southern Spain*, *equator*, *northern Spain*, *Canada*. Pupils match the words in each column. Correct after pupils have read the page.

Main concepts

- Focus on the words *deciduous* and *coniferous*, explaining the meanings.
- Discuss why forests are important for the Earth and why they are known as the Earth's lungs. *Trees use carbon dioxide for photosynthesis and release the oxygen that we breathe.*

Learn more

- Pupils make a chart with the headings: *Forest name*; *Types of trees*; *Animals*; *Location*; *Climate*.
- Pupils can find examples of how animals have adapted to living in forests.

UNIT 2
PAGE 24

Objective

Pupils will learn about the characteristics of desert ecosystems and the organisms that live there.

Key vocabulary

desert, fauna, flora

Warm up

- Explain that it may look like nothing lives in the desert, but lots of organisms have adapted to living there. Ask pupils for ways that they keep cool when it is hot outside.

Main concepts

- Ask pupils where most deserts are found and why. They stick a world map in their notebooks, colouring in the deserts.
- Pupils write the desert adaptations in bullet form in their notebook and research additional ones.
- Pupils can compare and contrast life in a desert with life in the tundra.

Learn more

Call and answer game: Shout out a desert adaptation. Pupils respond with the benefit. For example: Teacher – *Snakes are nocturnal.* Pupil – *It's cooler to hunt at night.*

They store nutrients in their humps and don't lose much water. They can go for long periods without food and water.

The Sahara Desert in northern Africa is the largest non-polar desert in the world

HOW DO CAMELS SURVIVE IN THE DESERT?

Discover... how organisms have adapted to high temperatures and little water.

Deserts are the hottest and driest places on Earth. During the day, temperatures can reach up to 50 °C, but can drop to 0 °C at night. Living things have adapted to the changes in temperature and the lack of water.

What is the largest desert in the world? Where is it found?

When it is scorching hot outside, what better way to beat the heat than to sleep all day? Many desert animals are **nocturnal**. They are only active at night when it is cooler.

A cactus can **store water** for long periods of time. They have got a thick waxy layer and **spines** instead of leaves, which reduces water loss. The spines also protect the cactus from animals that might want to eat it!

Find examples of nocturnal animals.

Camels **store nutrients** in their humps and lose hardly any water through sweating or urination. This means they can go for a long time without having a drink or a snack!

Explore STAGE 3

- Research the flora and fauna of your ecosystem. What are the adaptations needed to live in this ecosystem? Think about food, water, predators, prey and climate.
- Add the information to your diagram from Stage 2.
- Tell a partner what you discovered.

I found out that ...

I discovered that ...

Pupils can research the flora and fauna of their chosen ecosystem at home, but discuss the adaptations with a partner during class time. Focus on special qualities of the plants and animals when discussing adaptations.

Example answers: badger, bat, cougar, coyote, hamster, leopard, mouse, owl, porcupine, raccoon, scorpion, skunk, wombat

The layer of fat acts as an insulator against the cold.

Here's the hidden object!

WHY DO POLAR BEARS NEED TO BE FAT?

Find out more...

Discover... how some animals can survive in very cold temperatures.

Background: Some animals that live in very cold temperatures have got a thick layer of fat, called blubber.

Hypothesis: If you had more fat on your body, would you notice the cold as much? Why? / Why not?

Materials: large bowl, water, ice cubes, butter

Step 1: Get a bowl large enough to fit both hands in. Fill it with water and ice cubes. Leave it for five minutes.

Step 2: Put both hands in the bowl and count to ten. Take your hands out and warm them for a few minutes. This is the **control**.

Step 3: Now, rub butter over one hand. Put both hands back in the water and count to ten.

Step 4: Wash your hands with warm water and soap.

Hotspot 1 How does each hand feel in the water? Do both hands feel the same?

Hotspot 2 How does each hand feel this time? Do both hands feel the same?

In conclusion, ...

Conclusion: What did you find out? Do you think extra fat on your body would keep you warmer? Why?

Animals in colder climates need ...

Both hands should feel the same (cold).

The hand with the butter should be less sensitive to the cold.

UNIT 2
PAGE 25

Objective

Pupils will understand the importance of adaptation to a cold habitat through experimentation, using the scientific method.

Key vocabulary

Arctic, Antarctic, tundra, adapt

Warm up

- Ask pupils to name animals that live in cold areas. Ask what adaptations these animals might need to survive in the tundra. Locate Arctic and Antarctic areas on the map.

Main concepts

- Explain that fat is an insulator, which means it keeps heat in and cold out. Read the introduction as a class.
- Pupils explain their reasoning for their hypothesis before carrying out the experiment.

Learn more

- Talk about adaptations to Arctic conditions, like fur, slow movement and camouflage. Ask pupils which they think is most effective for surviving in the cold.
- Lead a discussion comparing the adaptations in the documentary and encourage further research.

UNIT 2
PAGE 26

Objective

Pupils will learn about the characteristics of aquatic ecosystems and the organisms that live there.

Key vocabulary

aquatic, coral, freshwater, marine, pond, river, shoreline

Warm up

- Before reading the page, ask pupils to name different bodies of water and list these on the board.

Main concepts

- Ask pupils to explain the difference between *marine* (salty) and *freshwater* (without salt). Refer to the warm up and label the bodies of water as marine or freshwater.
- Explain that some abiotic factors do not affect aquatic ecosystems. However, sunlight and temperature play a very important role. Discuss the reasons why as a class.

Learn more

- Remind pupils about the water cycle. They can research how it affects the organisms that live in freshwater ecosystems.
- Ask pupils to describe a day at the beach to a partner, focusing on the biotic and abiotic factors.

Flora: bulrushes,reeds, waterlilies; Fauna: fish, crocodiles, turtles and frogs

WHAT LIVES IN A POND?

Discover... the difference between a marine and a freshwater ecosystem.

Aquatic ecosystems can be ...

MARINE

Water type: salt water
Examples: oceans and seas
Flora: giant kelp, seagrass, sea grapes and plankton
Fauna: sharks, turtles, dolphins, crabs, jellyfish and sponges
Fact: It is the largest ecosystem on Earth!

FRESHWATER

Water type: fresh water
Examples: lakes, rivers, streams and ponds
Flora: bulrushes, reeds and waterlilies
Fauna: fish, crocodiles, turtles and frogs
Fact: Water is constantly recycled.

Coral reefs are one of the most diverse ecosystems on Earth. They are home to about 25% of all marine life. Many animals, such as clownfish, sponges and sea anemones make coral reefs their home because of the safety they provide.

Find a marine reptile hidden in the unit.

Despite their small size, **ponds** are home to a variety of aquatic life, like snails, frogs, fish and large birds, such as herons.

The **shoreline** is where the sea meets the land. Organisms that live here, such as starfish, molluscs and sea urchins, have adapted to strong tides and waves. Most can stick to the surface of rocks.

Look back Protists dominate aquatic ecosystems. Are protists unicellular or multicellular?

Sea turtle on page 25

They can be unicellular or multicellular.

For next lesson... shoe boxes, creative materials for ecosystem activity

Living organisms (flora and fauna), abiotic factors (soil, rocks, water, sunlight, temperature, air, climate). Pupils should use *because of* + noun, or *because* + subject.

Peregrine falcon

WHICH BIRD OF PREY LIVES IN NEW YORK CITY?

Discover... the natural and artificial elements of an urban ecosystem.

Instead of adapting to ecosystems, humans have adapted ecosystems to suit them. These are known as **urban ecosystems**. They have got many **artificial elements**, but also contain **natural elements**.

Artificial elements include buildings, airports, parks and bridges.

What are the natural elements of an urban ecosystem? Discuss.

The natural elements include ...

Animals can survive here because ...

New York City has got a higher **peregrine falcon** population than most places on Earth. All the skyscrapers make a great habitat for these birds of prey. They provide an ideal look-out point, in the same way cliffs do, for prey such as pigeons and blackbirds.

Explore STAGE 4

- Now that you have studied the different types of ecosystem, you can add this information to your diagram. What characteristics define your chosen ecosystem?
- Does your ecosystem contain any artificial elements? Find out and make a list of the consequences of human interference.

Pupils can prepare Stage 4 at home or at school. You can spot check some pupils' information as a class.

Extra Activity, page 91:
Pupils choose an ecosystem and make a three-dimensional book.

UNIT 2
PAGE 27

Objective

Pupils will learn about the characteristics of urban ecosystems and the organisms that live there, and understand the difference between natural and artificial elements.

Key vocabulary

artificial, natural, urban

Warm up

- Pupils name the animals and plants they have seen in nearby cities and towns.

Main concepts

- Pupils list the natural and artificial elements in their local area and then discuss how the animals and plants have adapted. Pupils can draw their neighbourhood, circling the natural elements in one colour and the artificial ones in another.
- As an alternative to the Extra Activity on page 91, pupils could create a model of an ecosystem using a shoe box. They should label the biotic and abiotic factors.

Learn more

- *Give one, get one game:* Pupils write a fact about an ecosystem on a piece of paper. They walk, exchange their fact, then review how many facts they can recall.

UNIT 2 PAGE 28

Language Review answers

1 a better

b more diverse

c less extreme

d more effectively

e more easily

2 Focus on developing a conversation and using connectors. Pupils should comment on what their partner says. For example: *Both pictures show a city landscape. However, in this picture the city looks clean, with better air quality. What's more, it has natural elements, like the park with trees. Also, there are probably lots of habitats. In the second picture, there are only artificial elements, and there seems to be a lot of pollution. There can't be many habitats here because the city has probably caused habitat destruction.*

This activity gives pupils practise of *A2 Key for Schools* Speaking Part 2, Part 1.

3 Pupils should state which they prefer, then give reasons why. For example: *I prefer urban environments because … there is more to do / there are more shops / more people live nearby / it's easier to get to places. I think rural environments are more enjoyable because … there is less noise and pollution / I love nature.*

This activity gives pupils practise of *A2 Key for Schools* Speaking Part 2, Part 2.

Language Review

1 Complete the sentences in your notebook with the correct form of the adjective or adverb.

a The spines on a cactus make it ..... (good) at reducing water loss than a plant with broad leaves.

b Tropical rainforests are home to a ..... (diverse) range of species than anywhere else in the world.

c Temperatures in temperate grasslands are ..... (extreme) than in deserts.

d The Iberian lynx can hunt ..... (effective) in a habitat with thick grass and open land than in a city.

e Thanks to their blubber, polar bears and seals can tolerate cold temperatures ..... (easy) than most other animals.

2 Look at the photos. Talk with a partner about urban ecosystems. Mention the things in the box.

natural elements artificial elements habitats habitat destruction pollution air quality

Also, ... What's more, ... However, ... On the other hand, ...

3 Do you prefer urban or rural environments? Discuss with a partner.

Content Review

1 Unscramble the letters to make words. Use some of the words to complete the sentences.

ecoosstmy svaohnasn dpoat oulpoatipn htbaiat sderte

a ..... are a type of grassland found in tropical areas.

b A ..... is the home of a living thing.

c An ..... is made up of a community of organisms and the abiotic factors in an area.

d Living things ..... to their natural surroundings.

Assessment link For more Unit 2 activities go to page 80.

2 Look at the photos and identify the ecosystems. Write down two characteristics of each ecosystem.

a b

Explore FINALE

- Prepare and carry out a presentation on your ecosystem. You can find others who have chosen the same ecosystem and work in pairs or small groups.
- Use the information you have collected and include some pictures or videos.
- Think about the structure of your presentation. How many sections will it have? What are you going to say? What is your partner going to say?

28 29

Encourage pupils to revise the unit content using the techniques from Pupil's Book page 81.

Support pupils' use of a computer-based presentation tool. Encourage the use of pictures and videos from the Internet. Check and assist with pupils' presentation structure. Allow one or two lessons for presentation time.

UNIT 2 PAGE 29

Content Review answers

1 ecosystem, savannahs, adapt, population, habitat, desert

a Savannahs

b habitat

c ecosystem

d adapt

2 a Rainforest ecosystem. Example answers: warm or tropical, found near the equator, lots of rain, many different plants and animals

b Shoreline ecosystem. Example answers: aquatic, marine, where the sea meets the land, organisms are adapted to strong tides and waves, most organisms stick to the rocks

UNIT 2 ASSESSMENT PAGE 80

Think about it answers

1 A community of living things and the physical environment that surrounds them. Living (flora and fauna) and non-living (abiotic factors) components.

2 Soil, rocks, water, temperature, air, sunlight, climate

3 Pupils' own answers

4 Pupils' own answers

5 2,500,000,000 or 2.5 billion. If they are the same species of bacteria, then population. If they are various species, then community.

6 Nocturnal, store nutrients, reduce water loss through sweating and urination, store water, reduce water loss through spines

7 Pupils' own answers

8 Aquatic / marine. Clownfish, sponges, sea anemones. Also, coral reefs are actually animals!

9 Peregrine falcons, other birds, mice, rats, ants, bears, coyotes, foxes

10 Pupils' own answers. Focus on the difference between natural and artificial elements.

Think harder answers

1 Pupils' own answers. If one organism is affected, all the other organisms are as well.

2 Pupils' own answers

3 Being eaten (especially by crocodiles), drowning in a river, starvation, dehydration

4 Pupils' own answers

5 It produces large amounts of oxygen, which most organisms need to breathe. It absorbs large amounts of poisonous carbon dioxide and provides many organisms with shelter. There would be less oxygen produced on Earth and less biodiversity.

6 Their ears can grow to half the size of their body. These large, thin ears allow more body heat to be released.

7 Pupils' own answers. Focus on items that would keep someone warm, dry and camouflaged, as well as food and drink. Encourage pupils to use a proper introduction, conclusion and a variety of connectors between sentences.

8 Oceans – 96.5%; other saline water – 0.9%; freshwater – 2.5% (surface – 1.2%, ground water – 30.1%, glaciers and ice caps – 68.7%)

9 Freshwater or aquatic. Natural. It provides all the necessary biotic and abiotic factors.

10 Any major disaster that caused a major decrease in biodiversity or environmental quality. Examples might include: Chernobyl nuclear disaster, Exxon Valdez oil spill, volcanic eruption of Mount St. Helens.

UNIT 2 TRACKLIST

Track 10	Page 19, Song *Ecosystems on Earth*
Track 11	Page 20, *What makes up an ecosystem?*
Track 12	Page 22, *What is a savannah?*
Track 13	Page 22, *What is a savannah?* Listening activity
Track 14	Page 23, *Where do brown bears live?*
Track 15	Page 24, *How do camels survive in the desert?*
Track 16	Page 26, *What lives in a pond?*
Track 17	Page 27, *Which bird of prey lives in New York City?*